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Lower Yellowstone Project

Main Canal Bridge

United States Reclamation Service

1907 - 1908

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Lower Yellowstone Project

Main Canal Bridge

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By
Edrie Vinson
Architectural Historian

Montana Department of Highways
April 1988

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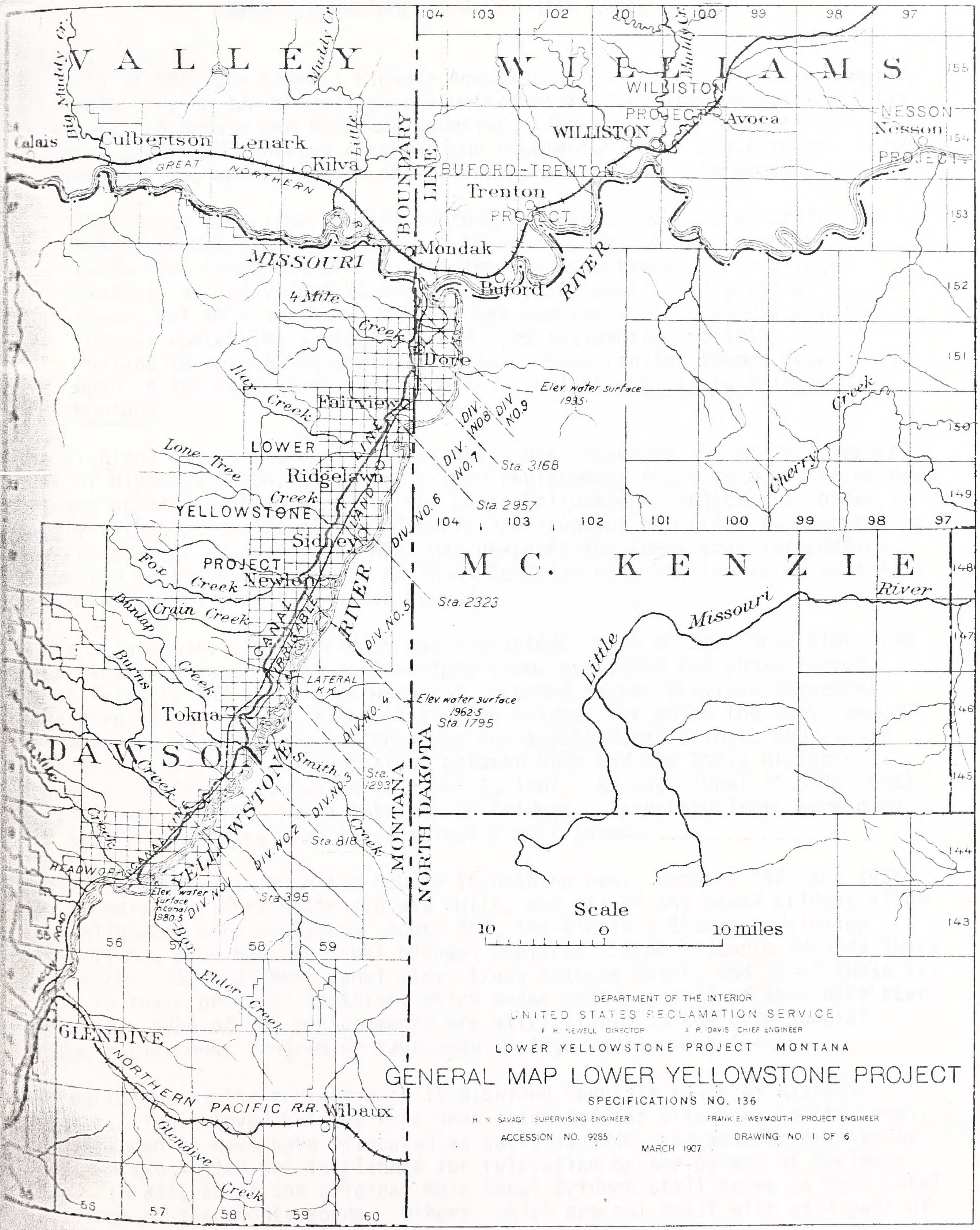

DEPARTMENT OF THE INTERIOR

UNITED STATES RECLAMATION SERVICE

F. H. NEWELL DIRECTOR A. P. DAVIS CHIEF ENGINEER

LOWER YELLOWSTONE PROJECT MONTANA

GENERAL MAP LOWER YELLOWSTONE PROJECT

SPECIFICATIONS NO. 136

H. N. SAVAGE SUPERVISING ENGINEER FRANK E. WEYMOUTH PROJECT ENGINEER

ACCESSION NO. 9285 DRAWING NO. 1 OF 6

MARCH 1907

LOWER YELLOWSTONE PROJECT, MAIN CANAL BRIDGES

Introduction

In April of 1985 the Federal Highway Administration requested a determination of eligibility on ten bridges on the United States Reclamation Service (USRS) Main Canal in Dawson and Richland Counties. The Keeper of the National Register of Historic Places returned the documentation as insufficient to make a determination, and requested the following additional information.

> This group of bridge appears to form a cohesive sub-group within the bridge thematic and you may wish to address this as an important evaluative component of their historical importance. Each bridge requires an individual statement of significance, as discussed above, but this series of bridges may require additional historical context concerning agriculture and land reclamation policies in Montana to supplement engineering and transportation themes developed in the cover form and Frederic L. Quivik's Historic Bridges of Montana.

The Richland County Board of Commissioners has requested the Montana Department of Highways (MDOH) to secure bridge replacement funds to build three new bridges across the Main Canal of the Lower Yellowstone Project. In order to comply with Section 106 of the Historic Preservation Act prior to undertaking any replacement projects, the MDOH has prepared the additional information requested by the Keeper of the National Register of Historic Places so that a determination of eligibility can be made.

A field inventory of the bridges was conducted. Each bridge found along the Main Canal was recorded on an inventory form, evaluated and photographed. Canal features and facilities were not recorded as per previous agreement regarding linear sites. Eight of the ten bridges for which the above request was made were found. One of those was not a USRS Canal Bridge, and it was determined ineligible by consensus, between MDOH and the State Historic Preservation Office (SHPO) on December 1, 1987. An additional 21 USRS Canal Bridges were located, for a total of 28 bridges. Inventory forms were done for all 28, rewriting even the original 7 HAER forms.

Replacing bridges in Richland County is nothing new. Between 1928 and 1936 the Glendive - Sidney Route #16 was built, and all of the canal bridges along that alignment were replaced. Route 200, the Circle - Sidney - Fairview highway, has also had the canal bridges replaced. From historic records there were either 35 or 36 Main Canal steel truss bridges built, and 18 of those are still in their original location, which means that one half of them have been replaced. None of the replacements are attributable to the 1970 Special Bridge Replacement Program or subsequent bridge replacement funds.

Not so common as the replacements is Richland County's reuse of historic bridges. Ten removed bridges have been accounted for elsewhere on the canal. One is known to have been relocated as early as 1946, and another as late as 1985. A stockpiled one is planned for relocation by the Bureau of Reclamation. In all, 28 of the original Main Canal Bridges still serve as Main Canal crossings on the county roads. Others, which are not dealt with as a part of this review, have been relocated to western Richland County.

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Moving a truss is never simple, and sad stories abound when county worker's conversation turns to such undertakings. The Richland County crew became proficient through trial and error, with experience as the best teacher. At least two pony trusses in recent memory were damaged beyond repair when they were lifted, and had to be dismantled and never used again.

Description of the Environment

The Lower Yellowstone Project was built in what was then Dawson County, Montana, and Allred County, North Dakota. In 1916 Richland County was formed out of the northeast portion of Dawson, and all but a few miles of the Main Canal are now in Richland County.

Richland County is situated in the far eastern portion of Montana where the waters of the Missouri and the Yellowstone Rivers drain from the state. One of the lowest elevational areas, there is only about 1,000' variation in the entire county, ranging from 2,900' to 1,865'. The Yellowstone-Redwater divide has steep erosional fronts, and the uplands break into the Missouri and Yellowstone benches and floodplains. The benches and lowlands are relatively flat.

The climate is one of extremes. Cold winters, hot summers, low annual precipitation and spring flash flooding are typical. Eighty percent of the 13" to 14" of water falls during the growing season of April through September, 120-130 days. Moisture in the form of heavy spring snows, thunderstorms, flooding from ice jams, and hail, are often the less desirable forms of precious water. A twenty-mile an hour wind occurs in the spring, with fifty-mile an hour not uncommon in fall and winter. The strongest winds come from the west.

Richland is in the short grass prairie. Most of the 2,103 square miles are grazing country. Dryland farming of some 200,000 acres produces wheat and other small grains. There are an estimated 66,000 acres of irrigable land, but only approximately half that amount is in production in any given year. Most of the irrigated acres lie along the Yellowstone River, and the bulk of those are along the west (north) bank. Principal irrigated crops are sugar beets and alfalfa. Oil wells drilled into the Williston Basin and strippable coal fields round out the economy, and leave their marks on the landscape.

The greatest alteration of the land form was the construction of the Lower Yellowstone Project irrigation canal, and the field leveling required to put irrigation water on the crops. Over six and one-half million cubic yards of earth was excavated in the construction of some 190 miles of canals and laterals. Topsoil was stripped from over 44,000 acres of private land to be irrigated, then replaced once leveling was completed, and ditches and drains were excavated. The most lasting visual modification was in the appearance of the vegetation once the project was completed. Where stood short grass in sparse proportion, now grows the finest of sugar beet crops in the region.

While the irrigation facilities were being built, the U. S. Reclamation Service predicted that a family of 5 persons would be settled on every 80 acre parcel on the project within a matter of years. That would have amounted to 40 persons per square mile. A. B. Linfield of Montana Agricultural College anticipated the development of a trade and allied industry population of about one person per each 8 to 34 acres of irrigated land in addition to the

farmers' families. A look at the present situation, however, indicates that population did not develop or disperse as expected. In 1970 there were less than 5 persons per square mile, and only half of them lived in rural areas. Within the next decade the population rose from 9,837 persons to 12,243, only 53% of which lived in rural areas. The increase was attributable not to irrigated agricultural development, but the rise in oil and gas production during that time span. The average was still only 5.9 persons per square mile. The average size of an irrigated farm is just over 219 acres.

When the Lower Yellowstone Project was designed, the towns of Tokna, Sidney and Fairview were placed on the planning map. Only the latter two are still in existence. The Reclamation Service established construction camps at LaMesa, Crane Creek, Newlon, Ridgelawn, and Dore, all of which were temporary. More permanent facilities were built at the "Headworks," around which the town of Intake grew. As the railroad was constructed between Mondak and Glendive in 1912, the towns of Savage and Crane were platted, and expected to thrive. Today their populations are less than were present in the first couple of years of their existence. Other railroad stations such as Burns, Sears, Piche, Jenks, Riverview, Wooley, Ludington, Dore and Nohly, either never made it to settlement status, or have since ceased to exercise economic importance. Only Sidney and Fairview have continued to grow in population, commercial, governmental and social influence. As a consequence, the landscape has few, rather than many, settlements. Also, it is remarkable that many of those residing in rural areas live in mobile homes, and are probably seasonally employed operating the irrigation systems. There are not many historic home-barn-farm complexes along the project.

Even the irrigation project itself did not live up to the fullest of expectations. Estimates of irrigable land fell from a 90,000 acre figure to 64,144 in 1909 when the canal was complete. Only 44,370 have actually been irrigated, 28,054 of which are located in Montana, and the balance in North Dakota.

History of the Project

In order to understand some of the problems associated with the Lower Yellowstone Project, a brief discussion of the history of irrigation and of the economy of the period is in order.

The Bitterroot Valley of western Montana had been irrigated before the mid-1800's, and the mountain valleys of the west, south, and central parts of the state were laced with ditches carrying water from small earth and rock dams. In the early 1880's the Big Ditch carried irrigation water to the Billings area on the Yellowstone River. This and the previous irrigation projects were built by individual farmers, an association of farmers, or by organized companies of investors who built projects and sold land and water to would-be irrigators. By around the turn of the century, just about everything easily irrigated was done.

The federal government had played a role encouraging private irrigation projects since the passage of the Desert Land Act of 1877, and in 1894 it further encouraged the states to undertake more difficult and large scale projects under the Carey Act. All homesteads claimed after 1909 had rights for ditches and canals reserved, to give maximum protection of access for private or public developers. But western politicians were impatient and were

overly optimistic about the possibilities, and they pushed hard to get the government directly involved in the construction.

In 1889, Montana's Senator Thomas H. Carter, an outspoken proponent of federal irrigation projects, claimed that:

> ...the lands of Montana [were] one-fifth good agricultural, three-fifths grazing land and one-fifth mountainous, and that by judicious husbanding of waters the three-fifths grazing land could be made good agricultural land, and that a part of the one-fifth mountainous could be raised to a high state of cultivation.

The same year John Wesley Powell, Director of the Geological Survey, told the Montana Constitutional Convention that one-third of the state could be irrigated, and that all of the waters falling within the state's borders could be impounded, channeled, and used for irrigated agriculture. While Carter's estimates of potential far outstripped Powell's, even the professionals had extravagant claims of possibilities. The Montana Society of Engineers predicted 20,000,000 acres or 21.4% of the state's land area was irrigable, and once watered, the land value would increase from $1 to $10 per acre. That amount of irrigated agriculture was expected to support a population of one and one-half million people using personal property valued as high as $100,000,000. (In 1982 a little over 2 million acres had been irrigated, 1.6 million of which was in cropland, or about 80%, and the balance was irrigated pasture.)

In 1902 Congress finally yielded to western pressure and passed the Newlands Reclamation Act. The legislation provided that funds collected from the settlement of public land would be set aside for constructing irrigation and reclamation projects, and that the settlers on those constructed projects would repay the interest-free funds according to the cost incurred per acre. The projects would be designed and supervised by the U.S. Reclamation Service, while an organization of the landowners would operate it and pay for its maintenance.

Preliminary surveys were authorized on the Yellowstone, the Sun River, and the Milk River, and between 1904 and 1906, construction projects were authorized on each of them, including the "Huntley" and the "Lower Yellowstone" on the Yellowstone River. The Reclamation Service also was building projects on Indian lands, and nearly a million acres were to be reclaimed as follows: the Lower Yellowstone, 60,116; Huntley, 32,405; Milk River, 219,557; Sun River, 216,346; Blackfeet Indian Reservation, 122,500; Flathead Indian Reservation, 152,000; and Fort Peck Indian Reservation, 152,000, totaling 954,924 acres.

In late summer of 1903 a reconnaissance of the project vicinity yielded information that the Yellowstone bluffs were too steep around Terry, and the gradient of the river too low to make irrigation realistic. Even the Glendive area was impractical, and finally a location 18 miles below Glendive was identified where an intake structure could be built. It was estimated that about 64,000 acres could be irrigated there for around $1.8 million, or roughly $30 per acre. Survey and design work was completed in 1904 and in 1905 construction camps were built.

Seventy-seven thousand acres of land to be irrigated were withdrawn from entry, and water from the Yellowstone River was appropriated. A Water User's Association was formed of 95% of the private landowners on the project, with the requirement that one join in order to acquire title to land there in the future. The association entered into contract with the Reclamation Service to repay construction costs, and to operate and maintain the canal once construction was complete.

Building the project included a "headworks" or intake dam on the Yellowstone River, 62 miles of main canal, 128 miles of laterals, ditches and drains, and numerous culverts, inlets, turnouts, dikes, levees, division boxes, drops, flumes, conduits, siphons and sluiceways. Contracts were let for conduits at Burns and Crane Creeks; inlets at Coal, Blacktail and Reno Coulees; sluiceways at Crane, Fox and Linden Creeks; flumes at Linden Creek, Collins, Hell, and Squaw Coulees; culverts at Sears Creek, Young's, War Dance, Grinnell, Indian and Dickinson Coulees; siphons were scheduled on Fox, Lone Tree, First Hay, Second Hay, Third Hay, and Four Mile Creeks, and Ferry Coulee; and a dam was built on Nelson Slough. A wagon road was constructed from Glendive to Fairview, and as the Main Canal was built, a road was placed to one side or the other to facilitate construction. Telephone lines were stretched the entire length, and 164 bridges totaling 3,135 feet were built across the canal and the laterals.

Six and one-half million cubic yards of earth were excavated, 17,170 cubic yards of riprap placed, and 26,164 barrels of cement were used to make 21,159 cubic yards of concrete. A portion of the work was completed by force account, but most was contracted. Water was delivered to the farms in 1909.

The project was plagued with problems from the very beginning. First off, the funds for construction were not available as anticipated, and piecemealing of work requiring reletting of bids, and delays in getting started. Of the 27 contracts awarded, only a hand full were completed on time and at the bid cost. Contractors had a hard time getting and keeping good employees once construction on the Milwaukee Railroad began. And several contractors went bankrupt during construction. A cloud burst in September of 1908 dumped over a million cubic feet of debris in the Main Canal, and the total cost of the project was double the projections. Of the actual irrigated lands, the costs were about $78 per acre, but the cost to the user was fixed at $42.50. Instead of repaying the cost in 7 years, or 1916, the interest-free debts of this fixed portion of the cost were retired in 1979.

The construction took place during a period of great financial instability. While it was a highly speculative period throughout the country, settlement and development undertakings in the west were particularly volatile, culminating in the stockmarket crash of 1907. The effect on the project can be summed up in just the cost of cement. It was $1.00 a barrel in 1905, $1.60 in 1906, $1.28 in 1907. Labor costs, too, troubled the contractors, so wages increased during periods of high demand and to resolve strikes. Contractors locked into prices from 1905 agreements were placed under severe financial strain, and some were unable to survive the inflation.

Comparatively speaking, the cost of construction was outrageous. Through 1913 the cost at $3,460,000 is equal to $34 million in 1985 dollars. Of the land actually irrigated the cost was $77.98 per acre then or $772.23 per acre in

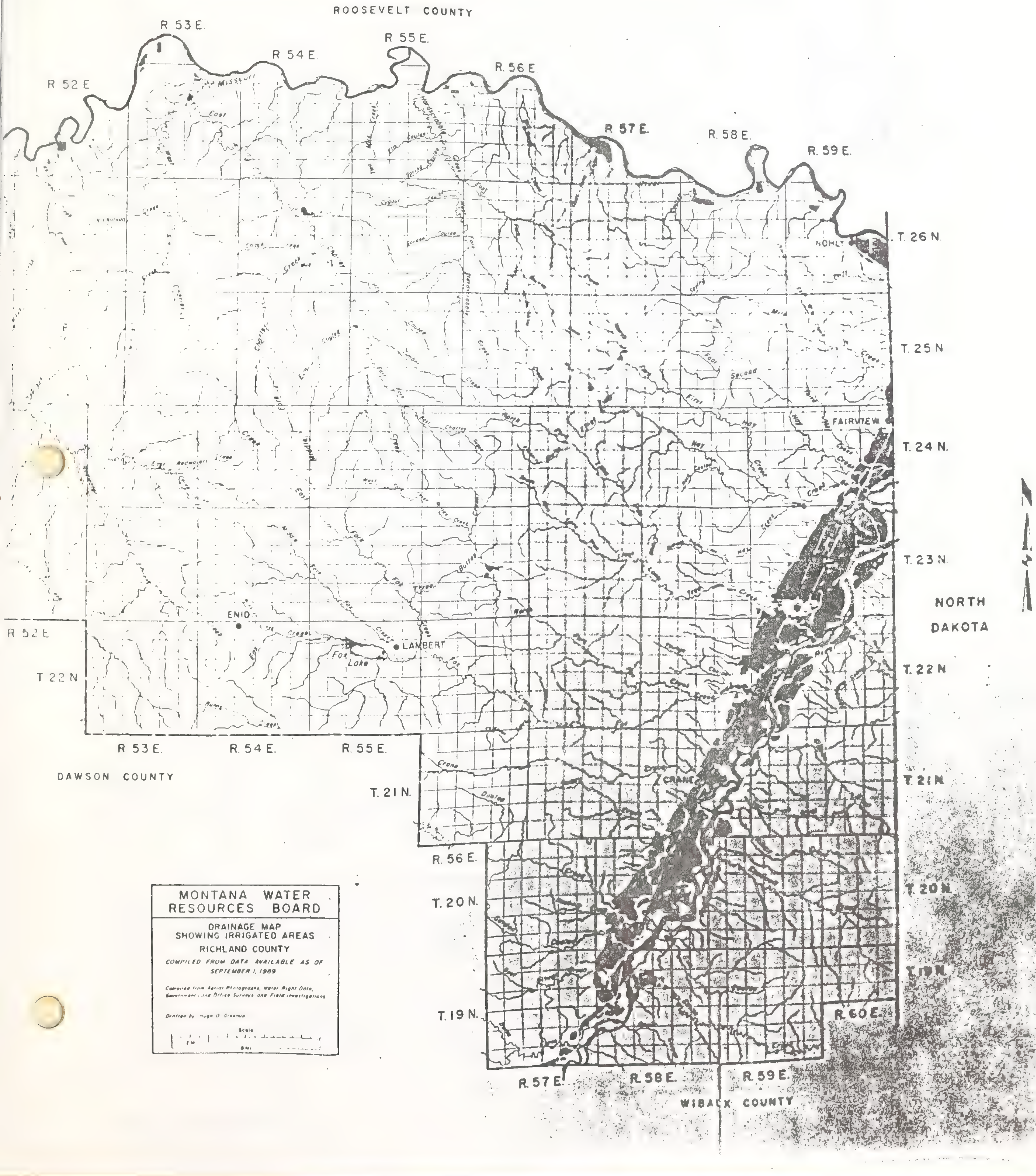
1985 dollars. This figure, of course, does not include the farmer's expenses of putting the water on his fields. An elaborate system today can cost upwards of $400 an acre. In 1985, good irrigated acreage there sold at $800, or no greater than the original cost of the Main Canal, and allowing nothing for the additional cost to irrigate it. The investment to value ratio is indeed poor. In the case of less than "good" land on the project, some sold as low as $400 per acre in 1985, or hardly half the cost of the project. When the project was built, 1909, the Northwestern Improvement Company sold its irrigable land at $3 an acre. (This is railroad land grant acreage claimed prior to the withdrawal of the project area from homestead settlement.) During the same time period, irrigable land elsewhere sold at $1 and irrigated land at $10 per acre. Meanwhile the Huntley Project had spent around $42 per irrigable acre; less than $14 had been spent on the Milk River Project; the Sun River one was just over $9 per acre; the Blackfeet as $7.35, Flathead at $10.13, and Fort Peck at $2.96.

Overall, the federal projects had a dismal record of user participation. In the 1910 census, only 4.8% of the total irrigated acreage in the state was on federal projects. Since 4% was Indian land, the .8% was divided among the four Newlands Act projects.

Of the nearly million acres made irrigable by the Reclamation Service, barely 5% were actually irrigated in 1913. The Huntley Project, the most successful of the group, boasted nearly 49% actually irrigated that same year, while the Lower Yellowstone, in its 5th year of operation, realized on 13% irrigated. Writing in 1910, the project engineer said that only 67 of 424 farmers had actually prepared their ground and used water. Some, he claimed, had "expressed dissatisfaction with the water right charges and refused to make application for water until some adjustment of their grievances was made." While the cost was likely the major bone of contention, the engineer justified the lack of participation by saying that "many of the present land owners are not of the type to make good intensive farmers"...and that few knew the principals of irrigated agriculture. A local farmer complained, on the other hand, that the land only "looked flat." Getting water distributed over the fields was not an easy chore.

In spite of the difficulties, overruns, and limitations, the Lower Yellowstone Project was never without its cheering section. In 1909, as it neared completion, the Montana Department of Publicity bragged that it had 90,000 of the finest acreage available for irrigated farming. And long after the acid test of time, a local history touted it as a "pattern for other irrigation systems throughout the United States...".

The turning point between fiasco and success came somewhere around 1925 when the Holly Sugar Company announced plans to build a factory in Sidney, and began contracting for the purchase of sugar beets. The landowners responded by leveling fields and subscribing to water delivery. By 1938 the farmers were selling crops at about $32 per acre, or the equivalent in 1985 dollars of a respectable $251 per acre. In order to accommodate the development, the Reclamation Service had to spend another $700,000 or so to provide the necessary ditches and drains. In 1949 the Savage Unit was constructed under the 1944 Flood Control Act to pump water from the Main Canal to the benchland above Savage, making irrigation of an additional 2,000 plus acres possible. Another 5,000 acres in the vicinity could be irrigated with three pumping



MONTANA WATER RESOURCES BOARD

DRAINAGE MAP
SHOWING IRRIGATED AREAS
RICHLAND COUNTY

COMPILED FROM DATA AVAILABLE AS OF SEPTEMBER 1, 1969

Compiled from Aerial Photographs, Water Right Data, Government Land Office Surveys and Field Investigations

Drafted by Hugh D. Greenup

plants financed by a loan and grant from the Public Works Administration. About one half of these acres are in production today. The results of these three federally sponsored undertakings are clearly visible on the accompanying map of Richland County produced by the Montana Water Resources Board.

The Holly factory still operates, and sugar beets continue as the leading cash crop. The irrigated crops have also stimulated the traditional cattle and sheep grazing industry. In the past, herds were limited in size to the available forage. Now grazing is supplemented after the growing season by beet tops or silage and by alfalfa, corn and other grains for winter feeding and fattening for the market. Many farmers also own or lease grazing areas in the uplands, and bring their herds into the project for winter care after the crops are harvested. Others purchase cattle from the range in the fall sale, fatten them, and sell them in the late winter or spring when prices are higher.

Main Canal Bridges

Construction of the bridges on the Lower Yellowstone Project was the easiest part of the job. All three of the contracts were completed on time or early, and all were finished for the contract price, a most unusual set of circumstances. Many of the other contracts were more than a year late, and one dragged on for 23 months beyond its expiration date. Several were cancelled for failure of the contractor to begin work, and they had to be rebid for higher amounts. And one was amended to increase the price nearly 40%.

Yet the bridge construction aspect was not without its problems. In 1906 the Service purchased 30,000,000 board feet of lumber to build wooden bridges and had it delivered to the bridge sites. When construction time came, the lumber had "gotten lost" or was delivered to the wrong places. Some of that which finally found itself in the form of a bridge was unfortunately too short to span the ditch. At least 2,575 sacks of cement got lost or ruined about the same time. The project engineer did not mention that the landscape was practically treeless, with only a few of the woody species being found in the form of cottonwood and willow along the banks of the Yellowstone. Bridge timbers undoubtedly made their way into farm buildings and Monarch stoves before the winter was over.

The 1907 construction season also had its disappointments. Plans and specifications for steel trusses (both pony and through), steel stringers, combination wood and steel trusses and timber stringers were prepared by the Project Engineer and reviewed in the Washington Office of the Reclamation Service. Upon approval, bids were requested for 16 steel and 20 combination bridges. When the bids came in the engineer learned that he could not award a contract for all those bridges because the account was short of funds.

A. Y. Bayne and Company of Minneapolis, Minnesota had submitted the lowest bid, and since his proposal met or exceeded the standards, he was given a contract to build three of the steel trusses. This was contract number 196 for a 60' span at War Dance Coulee, and two 80' spans for Lackeys and Pettigroves.

The War Dance Coulee or Schoolhouse bridge (24DW266) is a Pratt Pony truss. It required 38,262 pounds of steel and 3,600 board feet of lumber which was shipped by rail to Glendive, then hauled by the Service to the construction

site. Bayne had a crew on site to erect the bridge. For a ten hour day he paid laborers $2.25, a team and driver $2.50, carpenters $4 to $4.50, and foremen $5 to $6. In all, Bayne spent $141.75 in wages getting it set up. It cost the Service $1,765.70. USRS spent an additional $200 for hauling and $118.63 for engineering as in-house expense.

24DW266 is a single span, pin-connected Pratt Pony truss 60' long, 18' wide, and 8' high. See Design Specifications No. 136, Drawing 3 of 6 for details of the main truss members. The 60' is the only pony truss on the project this long, and the 2½" pins are as large as any used except on the through trusses. The lower chord is composed of two forged steel eyebars, while the upper is a continuous steel plate riveted atop 2 channel sections, and closed on the bottom flanges by lattice or lacing bars. The verticals are two angle sections riveted together with batten plates, while the diagonals are two forged steel eyebars, or eyebars with turnbuckles. A "U" shaped hanger supports the floor beam - stringer system. Double angle knee braces are riveted to the floor beam and to the upper part of the verticals with a gusset plate. The guardrails are angle sections connected by lattice bars forming an 18" strip. The running surface is wood plank, and the approach is gravel. It rests on concrete abutments.

The War Dance Coulee bridge is not only the first in terms of construction and the longest of the pony trusses, it is the only one of this design or construction detail. The more typical ones are described later under the "heavy" and the "light" bridge contracts.

No paint appears on this or on any of the other USRS Canal bridges. The contract required that the steel be cleaned and given "one coat of good iron-ore paint mixt [sic] with pure linseed oil.." before it left the foundry. After assembly it was to be painted again with 2 coats. The color was not specified. "Pins, borel pinholes, screw threads and all finisht [sic] surfaces shall not be painted but shall be coated with white lead and tallow as soon as they are finisht [sic]."

The 80' Lackeys (24RL163) and Pettigroves (24RL165) bridges Bayne built were identical. They are Pratt through trusses, a single span with 5 panels of 16' each. They are 17.4' wide, 16' high, and have a vertical clearance of 11'. Both are built on a 40 degree skew. The lower chords are eyebars connected with 3" pins upon which hang the U bolt that supports the floor beam - stringer system. The upper chords are of continuous steel plate riveted atop 2 channel sections. The bottom flanges are closed with lacing bars. The verticals are composed of four angle sections riveted together with lacing bars. Diagonal members are eyebars, and eyebars with turnbuckles. The portal bracings are of two angle sections riveted in place with gussett plates. On the center of the portals are plates upon which in raised letters is "1907 U.S.R.S." The portals and two inside struts are two angle sections, while top lateral bracings are eyebars. The guardrails are of two angle sections connected with lattice bars. They measure 18" in height. The deck is wood plank, and the road is gravel. See Specifications 136, Drawings 4 and 5 of 6 for plans for these bridges.

Each bridge has 55,986 pounds of steel and 5,000 board feet of lumber, and cost $2,630.50. The price included $250 in labor on the Lackeys, and $310.75 on the Pettigrove bridge. The USRS added in-house costs of hauling from

Glendive of \$200 and \$325, and for engineering, \$118.63 and \$105.42 on Lackeys and Pettigroves respectively.

These are the only two bridges of this design on the canal, and the only through trusses constructed on the job. Both are in reasonably good structural condition, with sufficiency ratings of 60.1 and 62.1, but are rusted, and have no paint.

Late in the year 1907 the USRS readvertised for steel bridges, and divided the job into two schedules, schedule 1 being for "heavy" bridges, and schedule 2 for "light" bridges. "Heavy" bridges were designed to carry a live load of 100 pounds per square foot of roadway, or an eighteen-ton traction engine with 11½' between axles and 5½' between central wheel planes. "Light" bridges were simply to carry a live load of 100 pounds per square foot of roadway. An increase of 25% in live and concentrated load was to be made in computing the truss stress, and a 40% increase in calculating for the floor system. If constructed today, they would be rated at about 15 tons and 10 tons respectively. Metal fatigue and deterioration, however, causes them to be rated at about half that capacity now.

The Minneapolis Steel and Machinery Company of Minneapolis, Minnesota got the heavy bridge contract (#218) for \$17,885. One bidder offered to do the work for \$1,171 less, but the proposal was not entirely satisfactory. In all, nine bids were received, and they ranged in price from \$16,714 to \$45,185. Contract #218 included the costs:

Number	Length	Cost Per Structure	Total
Steel Stringers			
2	22¼'	\$ 700	\$ 1,400
Steel Trusses			
1	38'	1,115	1,115
1	40'	1,150	1,150
1	50'	1,400	1,400
2	52'	1,520	3,040
3	54'	1,580	4,740
2	56'	1,625	3,250
1	58'	1,790	1,790
			\$17,885

Bid documents differ on exactly what was ordered, and another list says a 25½' and a 26' steel stringer, two 40' trusses, three 52' and four 56' ones. A third source agrees with that itemized above. The field inventory, however, differs. See Table 1. In all, the job required 180.8 tons of steel and 75 tons of lumber.

On the canal today are nine of the Minneapolis Steel and Machinery Co. heavy bridges. Plans for these heavy bridges were a modified form of Specifications 136, drawing 3. They are constructed as follows:

All are single span and either 4 panel Pratt Pony or 3 panel Queen Posts. The lower chords are constructed of forged steel eyebars connected by pins to the vertical members of two angle sections riveted together with lacing bars. The top chords are continuous steel plate riveted atop two channel sections and

closed on the bottom flanges with lacing bars. Diagonals are two eyebars or eyebars with turnbuckles. Knee braces are riveted at the I beam floor beam and to a gussett plate attached to the upper verticals. They were all designed with lattice guardrails and wood plank decks. The Minneapolis trusses are as follows:

24RL188	58'	Pratt Pony
24RL166	38'	Queen Post
24RL167	56'	Pratt Pony
24RL168	54'	Pratt Pony
24RL169	54'	Pratt Pony
24RL170	54'	Pratt Pony
24RL171	52'	Pratt Pony
24RL184	40'	Queen Post
32MZ908	25'	Steel Stringer

The key to quick recognition of the heavy Minneapolis Steel bridges is the lacing bars on the verticals and the "Lackawana" steel mark. Most, however, still have their original nameplates, and can be easily identified.

A. Y. Bayne and Company of Minneapolis, Minnesota got the contract (#219) for the "light" steel bridges for $17,389. The eight bids received ranged from there up to $50,860. The unit prices on Bayne's bid were as follows:

Number	Length	Cost Per Structure	Total
Steel Stringers			
2	22¼'	$ 337	$ 674
2	26'	450	900
Steel Truss			
2	32'	720	1,440
3	34'	781	2,343
1	36'	826	826
3	38'	872	2,616
3	40'	920	2,760
1	46'	1,047	1,047
1	48'	1,093	1,093
1	50'	1,140	1,140
1	52'	1,190	1,190
1	58'	1,360	1,360
			$17,389

Bayne used 145.7 tons of steel and 106.5 tons of lumber on the job. He purchased the steel from Carnegie, and that mark is found on most of his bridges. Just how many bridges Bayne built is uncertain. There are 21 above, and 20 on another source in the USRS records. It showed two 26', two 28', five 34', four 38', three 42', two 48' and one each 50' and 52'. Neither list appears to be correct. Today there are sixteen of these light trusses and stringers located on the canal.

24RL164	56'	Pratt Pony
24RL172	52'	Pratt Pony
24RL173	51'	Queen Post
24RL174	41'	Queen Post

24RL175	40'	Queen Post
24RL176	40'	Queen Post
24RL177	36'	Queen Post
24RL178	38'	Queen Post
24RL179	48'	Queen Post
24RL180	38'	Queen Post
24RL181	38'	Queen Post
24RL182	34'	Queen Post
24RL183	32'	Queen Post
24RL185	32'	Queen Post
24RL186	34'	Queen Post
24RL187	28'	Steel Stringer

The height of the pony truss varied according to length, as did the size of pins, I beams, etc., as shown on the plans (Specifications 136, Drawing 3). Here is the 40' description. The Queen Post light truss is a single span measuring 40' long, 18' wide, and 6' high. The bottom chord is of forged steel eyebars, and the top chord is of continuous steel plate riveted on top of 2 channel sections. Lacing bars are riveted to the bottom flanges. The vertical members are four angle sections connected with lattice bars. Knee braces of double angles are riveted to the floor beam then rise to near the top of the verticals where they are riveted in place with an 8" plate. The diagonals are eyebars or eyebars with turnbuckles. The lattice bars connecting two angle sections from the 18" guardrail, a distinctive feature on the bridges. The deck is plank, and the bridge sets on concrete abutments. The roadway is dirt and dirt with gravel.

Bayne's latticed verticals differ from the Minneapolis laced ones, and offer a quick identification should the nameplate be lost. Most, however, retain the plate.

Only two of the bridges on the Main Canal were steel stringers, one each heavy and light. The end sills and stringers were of steel, while the floor planks, "felloe guards," guardrails, posts and bulkheads were of lumber. They were to have "substantial wooden guardrails and posts securely fastened to the outside stringers and with wooden bulkheads suitable for retaining earth to a depth of three feet at the ends of the bridges." The stringers were to be 3' longer than the span of the bridge, and each end was to rest on three concrete piers. The specifications called for Douglas fir, and the guardrails and posts were to be given two coats of red paint. The last one is composed of 15" steel stringers, the heavy version, while 24RL187 is of 10" ones. Unfortunately neither have the wooden posts or guardrails.

As mentioned earlier, it does not appear that any combination steel-timber bridges were built. No contracts called for them, and it is unlikely any were built in-house. Timber bridges, however, were all built in-house. Probably the foreman simply took verbal orders from the engineer, and gave them to his crew, as no records were left as to where these were to be placed. Estimating from records that reflect plans rather than products, there must have been about 130 timber bridges built on the laterals, ditches and drains, and possibly some were even built on the Main Canal.

The problems of timber bridge construction have been mentioned earlier, but the lack of preservation of them should be dealt with here. The 1986 Montana

Timber Bridge Inventory and Evaluation failed to yield information on any remaining along this project. The bridges were built prior to the development and use of timber preservation techniques. The timbers were not creosote treated. The canal would carry water during the growing season, then be drained in the fall and remain dry until spring. These wet/dry cycles would diminish the natural preservation qualities of wood, rendering their life expectancy less than the 80 to 82 years since their construction. Some timber pile stubs are to be found along the canal. Whether these are remnants of bridges or of other canal fixtures has not been determined, and historic records are not available to assist in such a finding.

Bridge Builders

A. Y. Bayne and Company of Minneapolis built nineteen of the twenty-eight bridges remaining on the Main Canal today. It is likely that he built four or five more that have since been lost. But not counting the latter, Bayne is credited with building more bridges in Montana than any other builder except Security Bridge Company of Billings, who has 32 to their credit, and O. E. Peppard of Missoula, who, along with Bayne, has 27.

Bayne worked for Commadore P. Jones and Seth Maurice Hewett in the firm of Jones & Hewett, the prominent Minneapolis bridge builders. In 1883 he represented them as agent, and remained in that capacity with Jones when he split off to form his own firm in 1886. In 1888 Bayne contracted on his own, and then in 1892 joined the Gillette-Herzog Machinery Company as "Bridge Manager." Ten years later the group was renamed the American Bridge Company. In 1904 Bayne again struck out on his own, with A. Y. Bayne and Co. on his calling card. During this company's existence, he built the USRS Lower Yellowstone Project bridges. In 1914 he reorganized as the Minneapolis Bridge Company, A. Y. Bayne, President.

Less than 500 bridges were recorded in Montana's 1981 bridge inventory. Another study to identify additional ones is underway. Bayne's bridges in Montana may number much greater once the reinventory is complete, but also considering the 8 built by Gillette-Herzog during the time he was bridge manager, and the 14 built by the American Bridge Company, a portion of which time he worked there, and finally the 3 built by the Minneapolis Bridge Company, Bayne played one of the most significant roles of any bridge builder in the state.

Minneapolis Steel and Machinery Company has nine bridges remaining on the Lower Yellowstone Project. Approximately 4 more were built, but have since been removed. The company built at least 21 bridges in Montana, but likely many times that number will eventually be identified. The company formed out of the Gillette-Herzog engineering group when their American Bridge Company trust broke up about 1904, at around the same time Bayne got out and started his own firm. Minneapolis Steel and Machinery, L. S. Gillette, President, was a designer, fabricator and contractor, and its influence on bridge building in Montana continued into the 1950's or half a century.

Both contractors on the Lower Yellowstone Project were prominent in Montana bridge history. Minneapolis Steel and Machinery Company ranks second only to Bayne in the number known to have been built by an out-of-state firm.

Evaluation of Significance

The significance of each of the 28 U.S.R.S. Main Canal bridges is evaluated according to criteria established by the National Park Service as follows:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> A. that are associated with events that have made a significant contribution to the broad patterns of our history; or
> B. that are associated with the lives of persons significant in our past; or
> C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> D. that have yielded, or may be likely to yield, information important in prehistory or history.
>
> Criteria considerations
>
> Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:
>
> A. a religious property deriving primary significance from architectural or artistic distinction or historical importance; or
> B. a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or
> C. a birthplace or grave of a historical figure of outstanding importance if there is no other appropriate site or building associated with his productive life; or
> D. a cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or
> E. a reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or
> F. a property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historical significance; or
> G. a property achieving significance within the past 50 years if it is of exceptional importance.

Evaluation of Integrity

Moved bridges are evaluated as having lost integrity of location, including those that have been relocated along the Main Canal. None of the moved bridges fit the exception as "significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event." Bridges were initially located for very specific reasons. The primary one was that the wagon road, or stagecoach road, as it is often referred to today, was broken by canal construction. Five bridges were built as absolutely essential to the use of this road, and four of those still exist. The critical importance of the wagon road bridges is historically demonstrated three ways. First, when funds were found insufficient to contract for all of the bridges as originally planned, the USRS singled out three to build initially. All three carried the wagon road across the canal. Secondly, plans were prepared by the USRS for all of the bridges, and most were simply reusable or "typical" designs with charts for component sizes of various lengths. The three wagon road bridges differ from the others, two of which required more complicated design to fit a 40° skew. All are capable of carrying the heaviest loads. Two other bridges on the upper canal must have been constructed in-house as temporary wooden spans until a truss could fill the spot the following year when funds were available. Since no water was in the canal, a temporary wooden bridge may have been sufficient, but would likely have hampered the movement of heavy loads. And thirdly, the USRS consistently moved in materials for its own work as well as the work of its contractors. Contracts required delivery at either Glendive or Mondak, and USRS teams picked up the order, hauled it to the location where it was to be used, and unloaded it. It had to maintain traffic on the wagon road in order to get the project built. All four of the existing wagon road bridges have integrity of location even though the main route has since been changed to a paved highway which did not always follow the wagon road alignment. It diverged at points which resulted in sparing these original key bridges. Other Main Canal bridges encountered along the new alignment were replaced when the highway was built.

The other bridge locations were selected as intersecting access to the east or west of the canal. The locations were designated to perpetuate existing uses, generally on roads associated with settlements, particularly those providing access to the wagon road; to establish access over the canal in areas promoted for settlement where irrigation was believed feasible on either side; and possibly consideration was given to provide access to locations selected for railway stations. No historic records were found to substantiate the latter, but circumstantial evidence abounds. (See the USGS Quadrangle maps which show the canal, the railroad, the railroad stations, and the canal bridges). If this was the case, likely the Savage station was not on the early railroad plans, as no bridge was built there by the USRS. The town was platted after the canal was completed, and the bridge to the station was not erected until 1912.

The concentration of insitu bridges on the northern 40 percent of the canal would reflect primarily the greatest amount of irrigable land and the clustering of population near Sidney and Fairview, towns established before construction began, and to which new settlers tended to be drawn. It is interesting that the concentration of moved bridges is also in this area, as use has increased here rather than to the south where less irrigable land exists. The Minneapolis Steel and Machinery bridges mark those crossings

where heaviest use was expected, while the Baynes may be considered light or more local use.

Interestingly, use has changed for a number of the bridges. In heaviest traffic, such as Routes 16 and 200, none of the USRS bridges remain. Some of the others in situ, however, now serve only single farm access to irrigated fields or pasture. Moved ones most generally are also limited to light or single family access, a use for which they are best adapted, as cost often does not justify new construction in such locations. Those remaining in areas of heavier use are likely to be replaced due to inadequate safety ratings for the more than 80 year old structures.

Integrity of design was evaluated on all of the bridges. All of the plank on the decks has been replaced. None of the trusses have paint, yet all were originally painted. All have rust, some more than others, but these are considered changes due to age, natural weathering, environment, and lack of maintenance funds, and therefore not evaluated as loss of design integrity.

Design integrity is measured in completeness of the original building fabric, ie. no missing parts, and in identity of appearance. The design, while not uncommon, and highly likely duplicated in bridges built by these firms in many locations, can never-the-less be considered "distinctive" on this project. They can be recognized at a glance. The guardrail, for example, easily seen by pedestrian or motorist, is probably the most common feature identifiable by the general public.

Sufficiency ratings for the bridges were reviewed and recorded on each bridge site form. These ratings are from safety inspections completed bi-annually as required by Congress. The ratings were useful in two ways. First the inspection reports contain measurements and diagrams of the structure that facilitate recording, and often they contain historic information on the date of erection or the builders. They also, however, contain information on the truss members, note missing parts, and describe and evaluate condition in terms of load bearing capacity. Often the reports refer to replacements of parts, repair of abutments, etc., and many of these rehabilitations can be dated from the file information.

Aside from the purposes used in here in description, history, and integrity of design, the numerical sufficiency ratings play a critical role in determining maintenance needs, rehabilitation possibilities, and replacement decisions, all of which have an ultimate bearing on the potential for preservation. Scores of 0 to 50 make a bridge eligible for special bridge replacement funds, and to 50 to 80, eligible for rehabilitation funds. These bridges could not be rehabilitated to meet standard requirements of load bearing capacity since they were designed to carry much less when they were new. Normally the expenditure of rehabilitation funds is warranted only when rehab will result in a sufficiency rating of 80 or above. Design exceptions can be made, however, for historic bridges.

Just because a bridge scores lower than 50 or 80 does not mean it will be replaced or rehabilitated. There are far more bridges needing replacement or rehabilitation than dollars to do the work. While off-system priorities are set by the counties themselves, the selection for funding of necessity is made to correct the greatest safety problems. The Main Canal bridges that receive

little or limited use, therefore, will likely be in place for many years to come. With that in mind, the ratings are presented on the site forms for information only.

Application of Criterion A

The Lower Yellowstone Project itself is not being evaluated as a part of this review, and is discussed only at the request of the Keeper of the National Register of Historic Places to establish the historic context in which one can evaluate the Main Canal bridges.

The Lower Yellowstone Project was one of four federal irrigation undertakings authorized in Montana under the 1902 Newlands Reclamation Act, which signaled direct federal participation in irrigating the arid west. Federal participation however, did not live up to the expectations of the westerners, and to this day only about 2% of the state is irrigated. This project, by far the most expensive per acre irrigated, now comprises only 1.39% of Montana's total of irrigated lands. All of the federal projects, including those on Indian lands, are relatively insignificant when measured by the success of Montana's private developers and cooperative venturers.

On the local level, however, the construction of the irrigation canal was a major turning point in historical and economic development.

Richland County was formed in 1916 from the northeast portion of Dawson County. The severing was part of a broad pattern of county splitting that occurred in Montana during the late nineteenth and first two decades of the twentieth centuries. While the political subdivision itself was rather commonplace, there is little doubt but that the Lower Yellowstone Project was the primary factor in causing that portion of the state to take on an identity independence from Glendive, the county seat of Dawson County.

The Project had received a great deal of publicity that promised rapid growth and a dependable source of wealth. Consequently the growth of towns expecting to provide the goods and services to the well-to-do farming communities followed. Boosterism was high and appearances were critical. The newspapers demanded better roads and bridges across the Yellowstone to increase their opportunities for commerce. But the Dawson County Commissioners, unaccustomed to doling out for the hinderlands, ignored the clamor.

Richland's own county government could not be much more responsive to petitions for big ticket items until the economy really improved, and that came with the Holly Sugar Company, which, of course, is directly associated with the Project. Sugar beet payments put enough cash in circulation that the county prospered and built itself a nice new courthouse to rival that of Glendive.

While the agricultural economy of Richland has been subject to world market fluctuations, and still is at the mercy of the weather, it is less effected by drought, the one variable the Project was built to combat. The county fortunes still rise and fall according to the value of oil, but irrigated agricultural and cattle fattening lend a semblance of stability in otherwise tough economic times.

Within this framework, the USRS Canal bridges are visible reminders of that Newlands Reclamation Act Lower Yellowstone Project and its local importance to the agricultural economy of Richland County. As such, the bridges fall within the realm of Criterion A, "Properties that are associated with events that have made a significant contribution to the broad patterns of our history."

It must be remembered, however, that the construction of the Lower Yellowstone Project was a very complex one. The History of the Project section mentions the excavation and many of the facilities that had to be constructed to make this irrigation system work. The bridges evaluated here are but a small, comparatively insignificant part of the entire package, both in terms of cost and effect. The Project itself cannot be evaluated here because those facilities were not inventoried as a part of this review, and is beyond the scope of the responsibility of the Montana Department of Highways.

Application of Criterion B

The USRS Main Canal bridges also meet Criterion B as they were erected by two Minneapolis bridge building firms that have played a significant role of constructing bridges in Montana. The bridges on this project, likewise, represent a sizable portion of the bridges these two companies erected in the state, although these are not the most significant examples of their work style, or expertise, nor were these bridges designed by the builders.

A. Y. Bayne and Company built 19 of the 28 bridges identified on the Main Canal. Many of those erected by his firm retain the nameplate, which gives an immediate and highly visible direct association of the bridges to his firm. There are twenty-seven bridges in Montana built by Bayne, and others are still in existence that were built by firms he worked for, and had direct responsibility for. The 27 built under this company name date between 1906 and 1911, while the Main Canal ones date 1907 and 1908.

The Columbia Falls bridge, a 450' pin-connected Pennsylvania through truss built in 1911 is Bayne's largest bridge in the state. It has been determined eligible for listing on the National Register by consensus between the Montana Department of Highways (MDOH) and the Montana State Historic Preservation Officer (MSHPO).

The Minneapolis Steel and Machinery Company built nine of the USRS bridges remaining on the Main Canal. Many of these retain the nameplate on the bridge, making a direct association with the builder possible for the casual observer. There are at least 21 bridges in Montana built by this company, making it one of the four most prolific builders known to have operated in the state. Their historic bridges date from 1906 to 1916, but the company operated here into the 1950's, so the time span of significance will undoubtedly broaden once more research is completed.

The York Bridge, also a pin-connected Pennsylvania through truss built in 1906, (destroyed), and the Springdale Bridge, a Pratt span (1916) and a Pennsylvania through truss (1908), are better known examples of the company's expertise and technology in the state. Both were determined eligible.

Application of Criterion C

The Main Canal bridges may fit Criterion C as far as "properties that embody the distinctive characteristics of a type,..." and, "...that represent a significant and distinguishable entity whose components may lack individual distinction."

The Main Canal Bridges, all designed by the USRS engineers, are Pratt through trusses, Pratt Pony trusses, Queen Posts, and steel stringers. They were designed in two weights, "heavy" or about 15 ton size, and "light," or about 10 ton capacity. Descriptions of the range of variation are found in the section above on bridges, and individual descriptions are found on each site form. Individual statements of significance were requested by the Keeper of the Register and are found below. These statements relate specifically to the Application of Criterion C and to the evaluation of integrity. Boundaries are the same as bridge location, including only the bridge and the abutments.

Application of Criterion D

No archaeological properties, historic or prehistoric, were found near the canal bridges. The construction of the Main Canal, the building of roads, ditches, dikes, laterals and drains, and the removal of topsoil to level the fields for irrigation, has so altered the landform that it precludes the possibility of locating insitu prehistoric or historic remains on the Project.

24DW266: Recommended be found eligible.

The War Dance Coulee Main Canal bridge was singled out by the U.S.R.S. as one of the three most critical bridges. It was one of three to be funded in 1907 when the account limitations prohibited construction of all of the trusses. It was the first constructed, is first in the long line of bridges down the canal, and at the time of its construction, it was critical to use of the wagon road between Glendive and Mondak, two points the railroad reached on either end of the project. All materials, equipment and crews traveling to work on this project from the Glendive area would have crossed this bridges. It has integrity of location.

The War Dance Coulee bridge is the longest Pratt Pony truss on the project, and its design differs from others primarily in its strength. The U-bolt hangers are common only to this and two through trusses. The specific drawing for this bridge was not included with other permanent records of the project construction. On others, the guardrails extended toward the approach at least as far as the connection of the upper and lower chords on the inclined end posts. On this, it does not. Whether this is a loss of historic fabric or difference in design is not known. The inclusion of this bridge is necessary, however, to rounding out the range of variety found in the Main Canal bridge.

24RL163: Recommended be found eligible.

Lackeys bridge, like that above, was critical to the use of the wagon road to haul equipment, men and supplies to work on the project. It was among the first three bridges built with the limited funds available in 1907. It has integrity of location.

It also has integrity of design. This, like 24RL165, required a special set of plans to design to fit the load requirements of the wagon road, and to fit the 40° skew on which the bridge had to be built. It is one of the two 80' spans, the longest on the Project, and one of only two through trusses built, the most sophisticated design on the canal bridges.

24RL188: Recommended be found eligible.

This bridge was located on the wagon road, but was not selected for initial construction in 1907 when funds were limited. While the record does not so state, likely a wooden structure was temporarily located here to span the canal and facilitate construction. The following year this and the others were built.

This is the longest heavy truss on the project. It has integrity of design, and is in relatively good condition.

24RL164: Recommended not eligible.

This bridge was erected as an intersecting road to connect the wagon road with what was planned to be the railroad station across the canal. The station, not built until 1912, was called Burns. A small community may have flourished there a short time, but has since disappeared. A concrete pumphouse and metal grain bin of modern construction completely alter the historic setting.

In addition to the loss of integrity of the historic scene, the design integrity is also diminished by the loss of a portion of the guardrail, the most distinctive and easily recognizable feature of the bridge.

24RL165: Recommended eligible.

The Pettigrove bridge is one of the first three bridges built, and it was historically in a critical location on the main wagon road. It was essential to the transportation of men and construction materials and equipment from the rail points at Glendive and Mondak to the construction sites along the project. It continued to play an important role in the transportation through the area until the construction of Route 16 from 1928 through the early 1930's.

The bridge has integrity of design, and its design is the most sophisticated of the group. This and the Lackeys bridge were the only two designed as

through trusses, and the only ones built on a skew to facilitate the wagon road. Drawings 4 and 5 of Specification 136 detail its design.

24RL166: Recommended not eligible.

This bridge is currently stockpiled near the Pettigrove bridge beside the canal road. It probably came from the lower portion of the canal between Second and Third Hay Creeks. A 38' Minneapolis Steel and Machinery "heavy" bridge was planned for that location. There are no USRS bridges on the stretch of the canal between those creeks today. The heavy bridge indicated an existing or anticipated heavy use. A county road carries east-west traffic from Route 200 to the hayfields of the Hay Creeks and on to upland range areas. The canal crossing is bridged by a recent structure.

24RL167: Recommended eligible.

This 56' Minneapolis Steel and Machinery Company Pratt Pony truss, or "heavy" truss, is on an intersecting county road, and probably was on an intersecting road when it was built. It was not on the main wagon road from Glendive to Mondak. It is in the original location according to plans.

This truss is an excellent example of the "heavy" bridges. All of its members are present and in good condition. The bridge is also structurally in the best condition of any of the USRS 1908 canal bridges, with a safety rating of 78.4. It has good preservation potential.

24RL168: Recommended not eligible.

This bridge is located on an intersecting county road, and likely was at the time it was built. It has been moved to the north and placed on new abutments.

This truss is one of the "heavy" bridges that has diminished integrity of design. The guardrail has been broken off on one side, and bent on the other. Some of the members are bent from collisions.

24RL169: Recommended not eligible.

This bridge has lost integrity of location. None was originally located here. This may have been the Sears Creek wagon road bridge, as it is structurally "heavy," and of a length to fit the upper canal.

Appearance of this bridge is compromised by spray paint applied by vandals, and the guardrails are bent.

24RL170: Recommended not eligible.

The bridge is in its original location on a section line intersecting road. It was located near the construction camp at Newlon. When the railroads were built, the town of Jenks formed east of there. Although two rails intersected, the Milwaukee and the Great Northern, the town failed to survive.

The bridge has bent and partially missing guardrails, which are the most distinctive feature of the canal bridges. It has also been vandalized by spray paint.

24RL171: Recommended not eligible.

This bridge has lost integrity of location. Originally it was at the fairgrounds, and in 1946 the Staffansons purchased it from the county and moved it here.

The bridge has also lost integrity of design. It has no latticed guardrail. Another truss was dismantled and its parts used in the rehabilitation of this privately owned one.

24RL172: Recommended eligible.

This "light" truss was built in current location to serve local traffic on an intersecting road along a section line. The road dead ends just west of the canal.

The bridge is a good example of Bayne's 4 panel pony truss as designed in Drawing 3 of Specification 136.

24RL173: Recommended eligible.

This bridge has integrity of location on an intersecting local or light traffic road.

It also has integrity of design. It is one foot shorter than 24RL173 above, the point at which the specifications called for a three panel or Queen Post bridge. Bayne was careful to follow instructions, and this is a good example of the design.

24RL174: Recommended not eligible.

The bridge is in its original location on an intersecting section line road. Designed a "light" truss for local traffic, it is not sufficient for the gravel trucks that must cross here.

The integrity of design is poor, as the original abutment has been scoured and tilted. The guardrail and truss members are bent from collisions. New stringers were added in 1986.

24RL175: Recommended not eligible.

This bridge was probably built to serve residents of the area, as it is mid-section, and not on the wagon road. There is no intersecting east-west road, and access is only by the canal road.

The condition of this Queen Post is very poor. The guardrail and truss members are bent. It is a poor example of a Bayne light truss.

24RL176: Recommended not eligible.

Also in mid-section, this bridge was probably built to serve a family living west of the canal. It currently is used by oil companies, and access is controlled by a barbed wire fence stretched across it, and a no trespassing sign.

Running planks have been added over the wood deck, giving the appearance of the loss of integrity of scale in height.

24RL177: Recommended not eligible.

This bridge has integrity of location serving an intersecting county road and local traffic.

A new stringer and deck system has altered its appearance. While the guardrail is positioned on the truss in its original place, it now sets on the deck and no longer serves its original purpose.

24RL178: Recommended not eligible.

The bridge was constructed here to serve local traffic. There is no road except the canal road now.

It has lost integrity of design. The guardrail is completely missing, leaving it a skeleton of its original appearance.

24RL179: Recommended not eligible.

A 38' Queen Post was planned for this spot, and it is not known when it was removed. The bridge here now was moved to this location in 1985. It is 48' in length, so a new abutment was necessary.

The bridge has lost integrity of design. The guardrailing is very banged up, and one end is missing.

24RL180: Recommended not eligible.

No bridge was built here, but his one was probably moved in at an early date to serve the Candee Farm. The abutments are different, and timber piles are present, which were not used on the original locations.

It does not have good design integrity. It is rather battered from vehicle collisions.

24RL181: Recommended not eligible.

No bridge was planned here. Just when this was moved in is not known.

The guardrailing is bent from accidents.

24RL182: Recommended eligible.

This location is the original site of this bridge, probably it was built to serve local traffic.

It has good integrity of design, and is an excellent example of the shorter Queen Posts used on the lower canal.

24RL183: Recommended not eligible.

This bridge has no integrity of location. The date of its move here is unknown, but likely early.

Running planks have been added to the deck. Otherwise it is intact.

24RL184: Recommended not eligible.

This bridge was relocated here in 1980. As a 41' heavy truss, its design does not fit its use on the lower portion of the canal, where a 32' truss would fit properly.

Design integrity is lost as a portion of its guardrail is missing on both sides of the bridge.

24RL185: Recommended not eligible.

A 32' truss was to have been built here, but this is not the one. This one was moved here in the late 1970s or 1980, replacing a timber structure. When the original was removed is not known. This one came from just south of Fairview.

Design integrity has been lost with the loss of the guardrail. It is not distinguishable as a USRS canal bridge.

24RL186: Recommended not eligible.

This bridge is in its original location as the last truss planned on the canal.

The loss of a portion of the lattice guardrail diminishes its design integrity.

24RL187: Recommended not eligible.

This steel stringer is likely in its original location, and is the last one in Montana on the canal.

As this is probably one of only two steel stringers remaining from the Lower Yellowstone Project, it is most unfortunate that this has lost design integrity. It is not recognizable as a USRS Main Canal bridge, and cannot be positively identified as such. There is no nameplate and date as on the USRS bridges.

32MZ908: Recommended not eligible.

This is the only one of what is believed to be a USRS bridge on the Main Canal of the Lower Yellowstone Project that is located in North Dakota. It is likely in its original location, and was the last one planned for the canal.

It has lost design integrity with the loss of its wooden members. See Drawing 2, Specifications 136 for the original design. It is not recognizable as a USRS Main Canal bridge, and cannot be positively identified as such. There is no nameplate and date as on the other USRS bridges.

Summary

There are 28 USRS Main Canal bridges remaining on the Lower Yellowstone Project. Nine were erected by Minneapolis Steel and Machinery Company as "heavy" bridges designed to hold 15 tons. Nineteen were erected by A. Y. Bayne and Company of Minneapolis. Sixteen of these were "light" trusses for about 10 ton weights, while three were designed for heavy use on the wagon road from Glendive to Mondak. Two of the latter were 80' through trusses, and the other was a Pratt Pony. The list below summarizes the design and characteristics of each.

Eight of the bridges are recommended as eligible for listing on the National Register of Historic Places: 24DW266, 24RL163, 24RL188, 24RL165, 24RL167, 24RL172, 24RL173, and 24RL182. The remaining 20 are recommended as not eligible for loss of integrity of location and/or loss of integrity of design. (See Table 1.)

The bridges were not considered eligible as a historic district or thematic bridge district due to loss of integrity. Originally there were 35 or 36 USRS Main Canal steel bridges. Today there are 28, 18 of which retain integrity of original location (only about 50 percent), meaning 17 or 18 have been removed. Besides the 1907-1908 USRS bridges, there are 27 more recent, or non-USRS structures that are intrusive or non-contributing. All of the bridges total 55, of which only 8 with integrity of location and integrity of design are too few to consider a district.

Nor was the Lower Yellowstone Project itself considered a historic district. The project consisted of approximately 62 miles of Main Canal and 128 miles of laterals. Besides this project, there are drains and ditches constructed in the 1930, others built as part of the Savage Unit in 1949-50, and still others as part of the three Yellowstone pumping units. No effort was made to relocate or distinguish these. The Lower Yellowstone Project also consisted of the construction of an intake dam; two conduits at Burns and Crane Creeks; three inlets at Coal, Blacktail and Reno Coulees; three sluiceways at Crane, Fox and Linden Creek; four flumes at Linden Creek, Collins, Hell, and Squaw Coulees; six culverts at Sears Creek, Young's, War Dance, Grinnell, Indian, and Dickinson Coulees; seven siphons were scheduled to be built on Fox, Lone Tree, First Hay, Second Hay, Third Hay, and Four Mile Creeks, and Ferry Coulee; and a dam on Nelson Slough. In addition there were numerous turnouts, dikes, levees, division boxes, drops, etc. Before the Project is considered a potential historic district these structures and features should be inventoried and evaluated. This is outside of the scope of work of this request for a determination of eligibility, and outside of the responsibility of the MDOH. Since the bridges were such a small part of the construction effort and meager portion of its cost, they should not be construed as representative of the project itself.

Table 1

Smithsonian Number	Contractor	Length	Through	Deck	Pony	Pratt	Queen Post	Stringer	Insitu	Moved	Integrity of Design		NR	
											Yes	No	Yes	No
24DW266	Bayne	60'			X	X			X		X		X	
24RL163	Bayne	80'	X			X			X		X		X	
24RL188	Minn.	58'			X	X			X		X		X	
24RL164	Bayne	56'			X	X			X			X		X
24RL165	Bayne	80'	X			X			X		X		X	
24RL166	Minn.	38'			X		X			X	X			X
24RL167	Minn.	56'			X	X			X		X		X	
24RL168	Minn.	54'			X	X				X		X		X
24RL169	Minn.	54'			X	X				X		X		X
24RL170	Minn.	54'			X	X			X			X		X
24RL171	Minn.	52'			X	X				X		X		X
24RL172	Bayne	52'			X	X			X		X		X	
24RL173	Bayne	51'			X		X		X		X		X	
24RL174	Bayne	41'			X		X		X			X		X
24RL175	Bayne	40'			X		X		X			X		X
24RL176	Bayne	40'			X		X		X			X		X
24RL177	Bayne	36'			X		X		X			X		X
24RL178	Bayne	38'			X		X		X			X		X
24RL179	Bayne	48'			X		X			X	X			X
24RL180	Bayne	38'			X		X			X	X			X
24RL181	Bayne	38'			X		X			X	X			X
24RL182	Bayne	34'			X		X		X		X		X	
24RL183	Bayne	32'			X		X			X	X			X
24RL184	Minn.	40'			X		X			X		X		X
24RL185	Bayne	32'			X		X			X		X		X
24RL186	Bayne	34'			X		X		X			X		X
24RL187	Bayne (?)	28'		X				X	X			X		X
32MZ908	Minn. (?)	25'		X				X	X			X		X
28	Bayne 19, Minn. 9		2	2	24	11	15	2	18	10	13	15	8	20

EV:1:mb:255/aa

Sources

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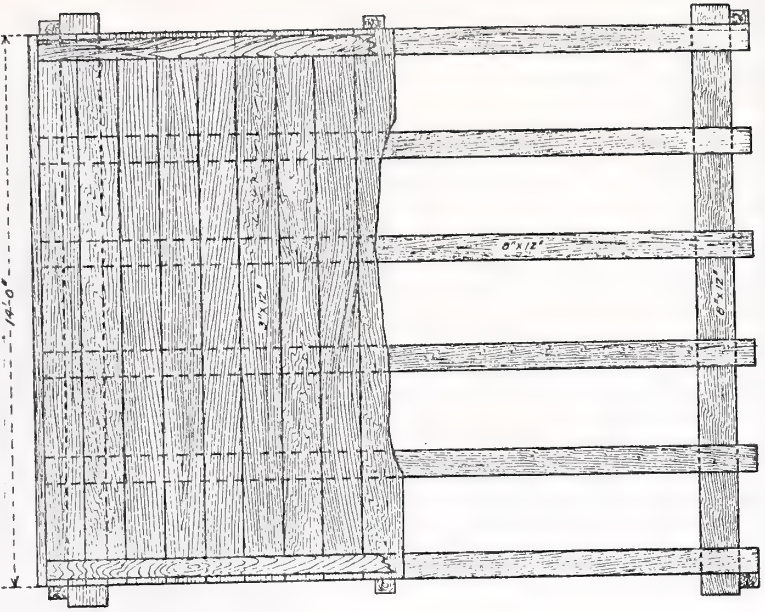


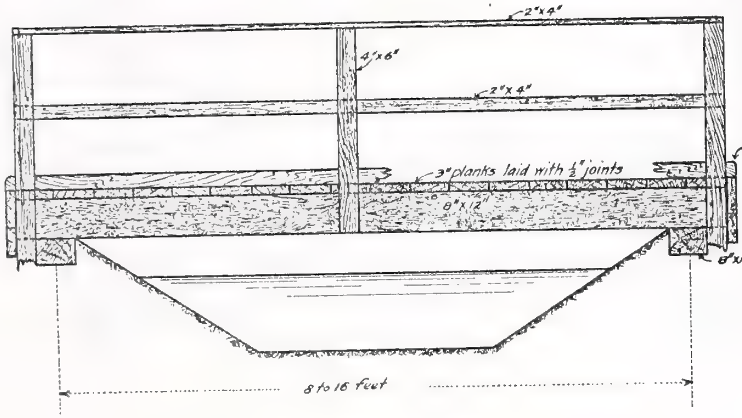
PLAN

LIST OF DRAWINGS
ACCOMPANYING SPECIFICATIONS NO 78
LOWER YELLOWSTONE PROJECT

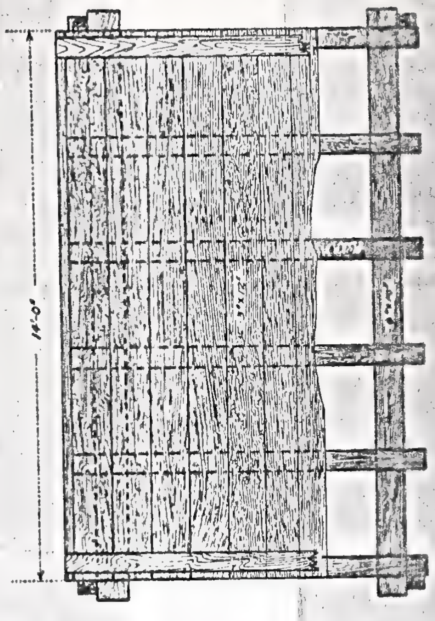
NO. 1 GENERAL PLAN
2 SIPHON AT FOX CREEK
3 CULVERT AT YOUNGS COULEE
4 SLUICEWAY AND SIPHON LONE TREE CR
5 SIPHON AT FIRST HAY CREEK
6 " SECOND " "
7 " THIRD " "
8 " FOUR MILE CREEK
9 " FERRY COULEE
10 STANDARD SLUICEWAY AND GATES
11 " SPILLWAY
12 " FLUME
NO 13 STANDARD CULVERT
14 " CULVERTS
15 " "
16 " "
17 TURNOUTS FOR LATERALS
18 " " "
19 " " "
20 DIVISION BOX FOR LATERALS
21 " " " "
22 DROPS FOR LATERALS
23 BRIDGES FOR LATERALS

All lumber Class I, rough.

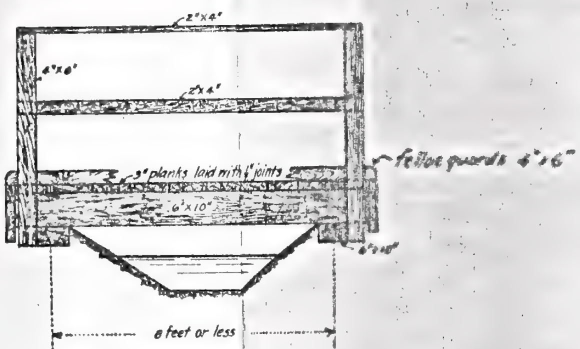
Scale of feet



LONGITUDINAL SECTION

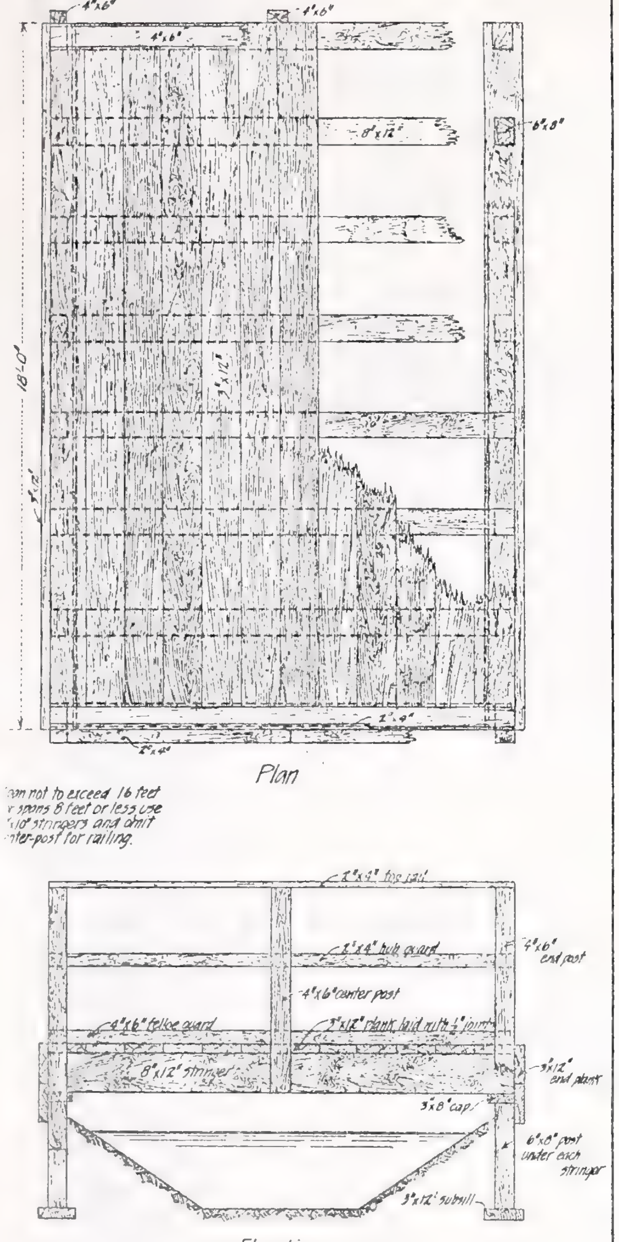


PLAN



LONGITUDINAL SECTION

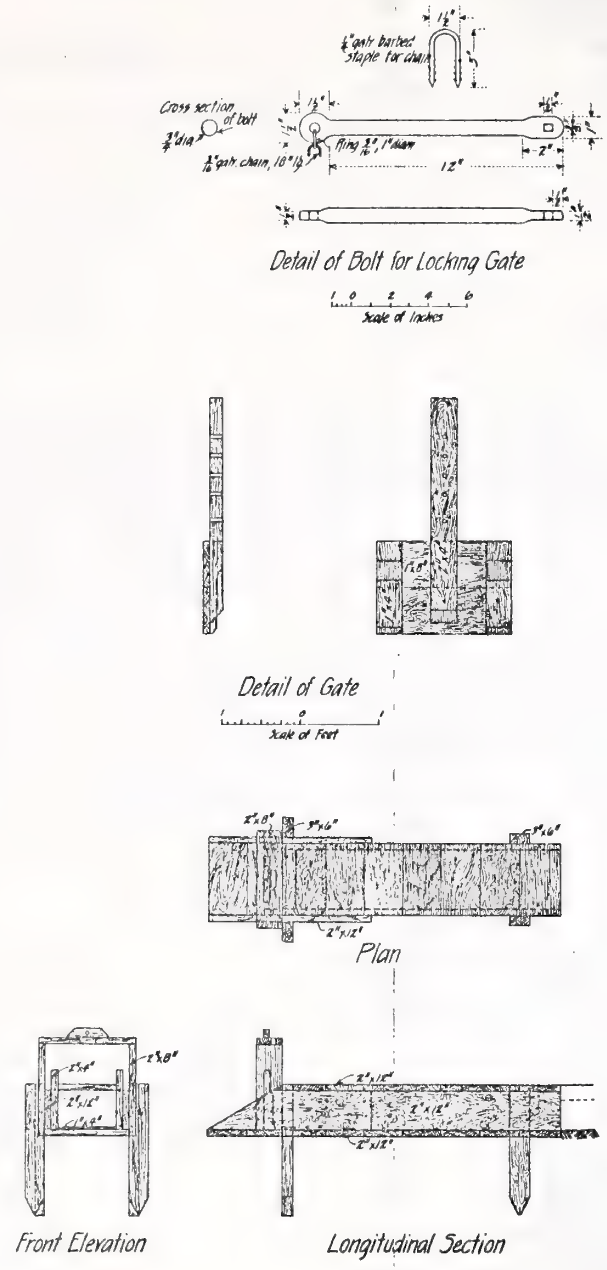
U. S. GEOLOGICAL SURVEY
[illegible]
RECLAMATION SERVICE
[illegible]
LOWER YELLOWSTONE PROJECT MONT.-N. DAK.
BRIDGES FOR LATERALS
[illegible]



…an not to exceed 16 feet
…r spans 8 feet or less use
…x10" stringers and omit
…nter-post for railing.

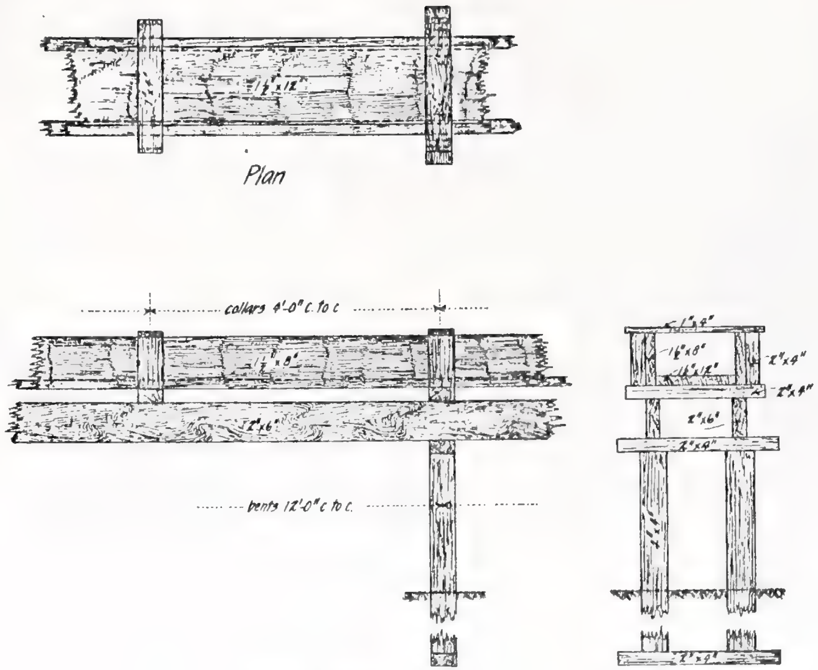
TYPICAL BRIDGE

Scale of Feet



TYPICAL SUB-TURNOUT

Scale of Feet



TYPICAL FLUME No 2

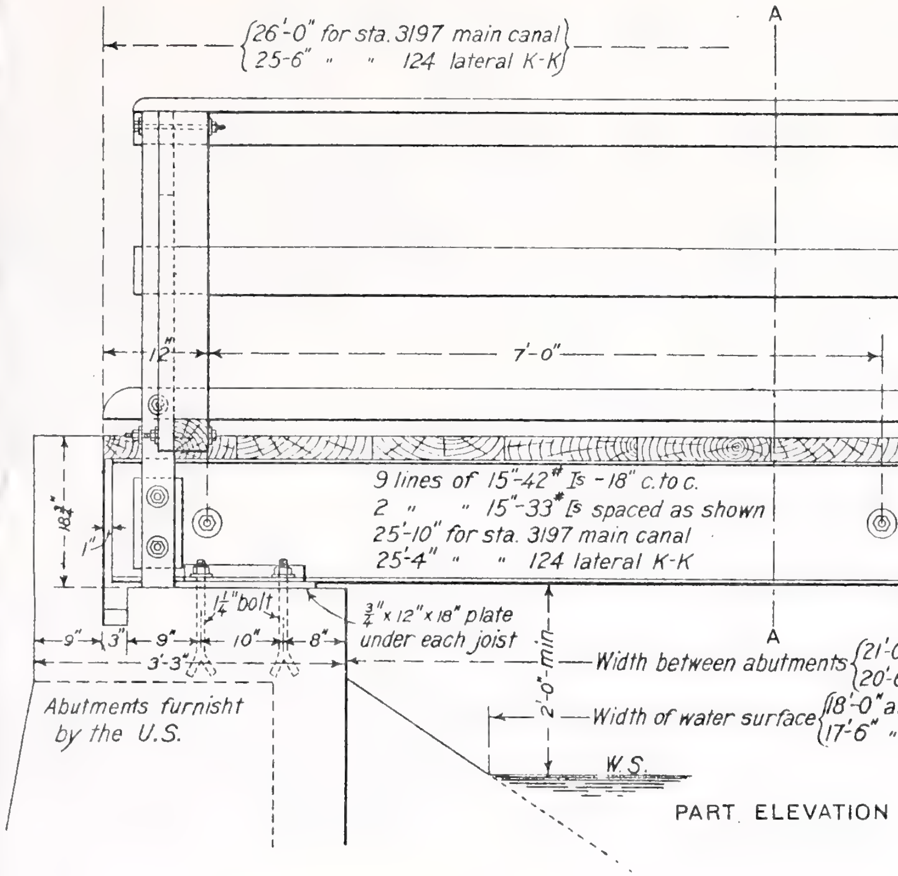
Scale of Feet

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
CHARLES D. WALCOTT DIRECTOR
F. H. NEWELL CHIEF ENGINEER A. P. DAVIS ASSISTANT CHIEF ENGINEER
LOWER YELLOWSTONE PROJECT MONTANA – NORTH DAKOTA
STRUCTURES - HEADWORKS TO NEWLON

TIMBER BRIDGE, SUB-TURNOUT AND FLUME NO 2

SPECIFICATIONS NO. 123
CONSULTING BOARD
A. J. WILEY H. N. SAVAGE AND F. H. NEWELL
ACCESSION NO. 8805 DRAWING NO. 11 OF 11
OCTOBER 1906

DRAWING NO. 2


{26'-0" for sta. 3197 main canal
25-6" " " 124 lateral K-K}
A
12"
7'-0"
18¾"
1"
9 lines of 15"-42# Is - 18" c. to c.
2 " " 15"-33# [s spaced as shown
25'-10" for sta. 3197 main canal
25'-4" " " 124 lateral K-K
1¼" bolt
¾" x 12" x 18" plate under each joist
9"
3"
9"
10"
8"
3'-3"
2'-0" min
Width between abutments {21'-0" at sta. 3197 main canal
20'-6" " " 124 lateral K-K}
Width of water surface {18'-0" at sta. 3197 main canal
17'-6" " " 124 lateral K-K}
W.S.
Abutments furnisht by the U.S.

PART. ELEVATION

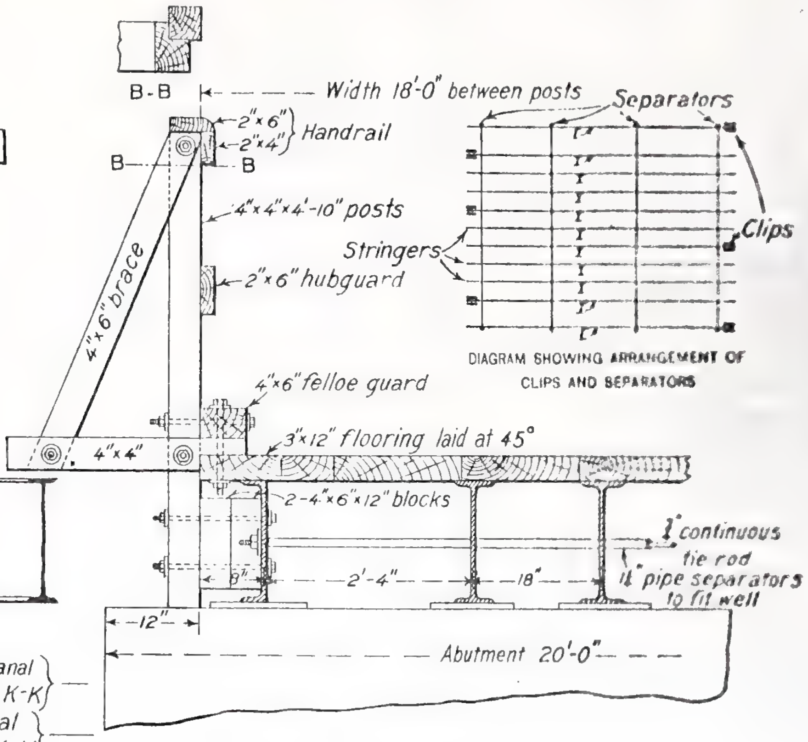
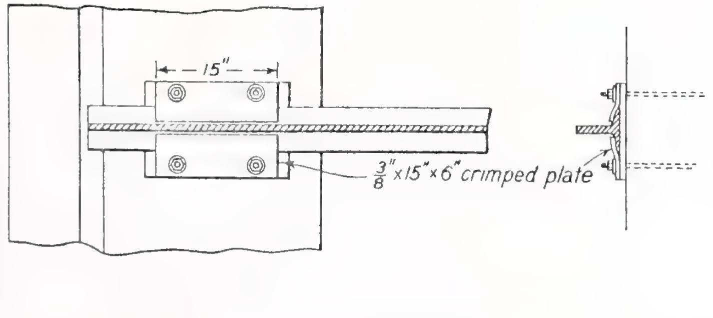


DIAGRAM SHOWING ARRANGEMENT OF CLIPS AND SEPARATORS

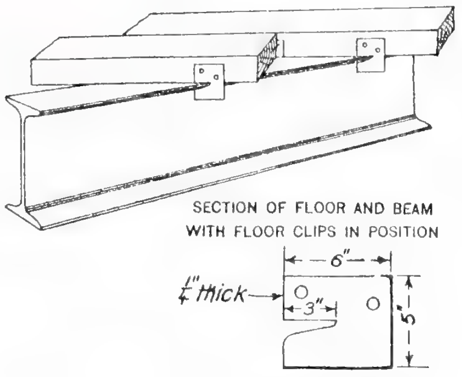
PART SECTION A-A

Notes:- Handrail, posts, and felloe guard to be surfaced on all sides and painted; all other lumber undrest.

Other forms of clips and separators may be substituted if appoved by the engineer.



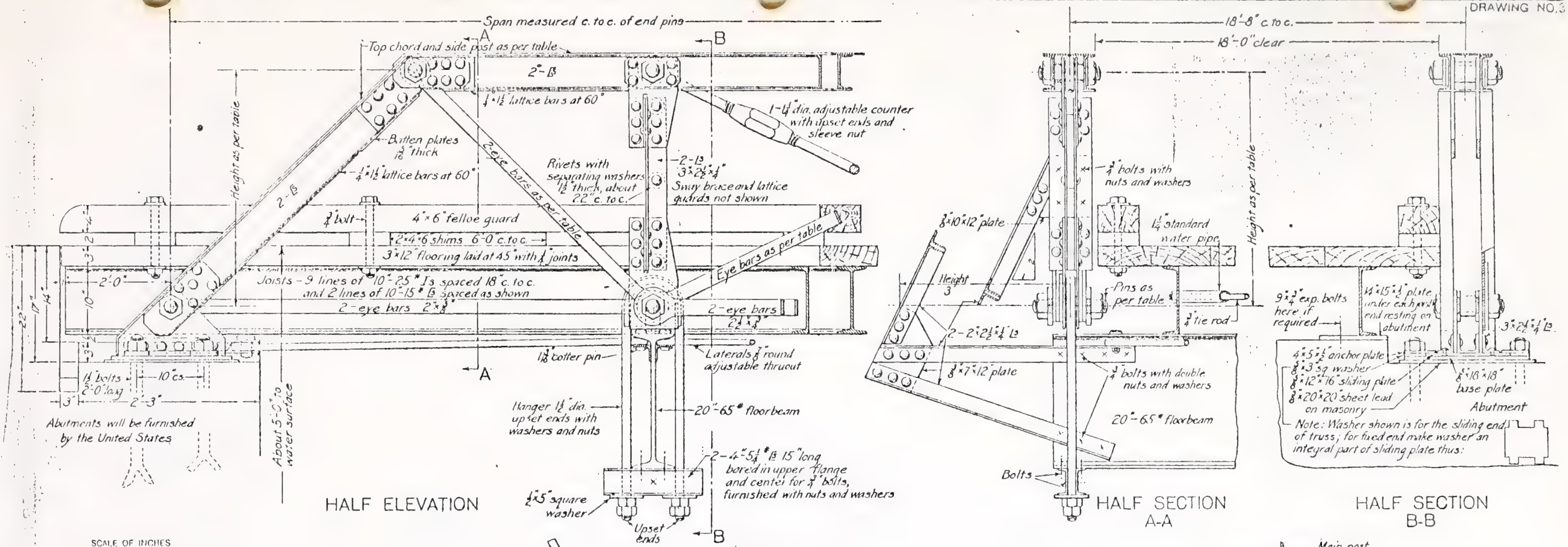
CLIP ATTACHMENT


SECTION OF FLOOR AND BEAM WITH FLOOR CLIPS IN POSITION

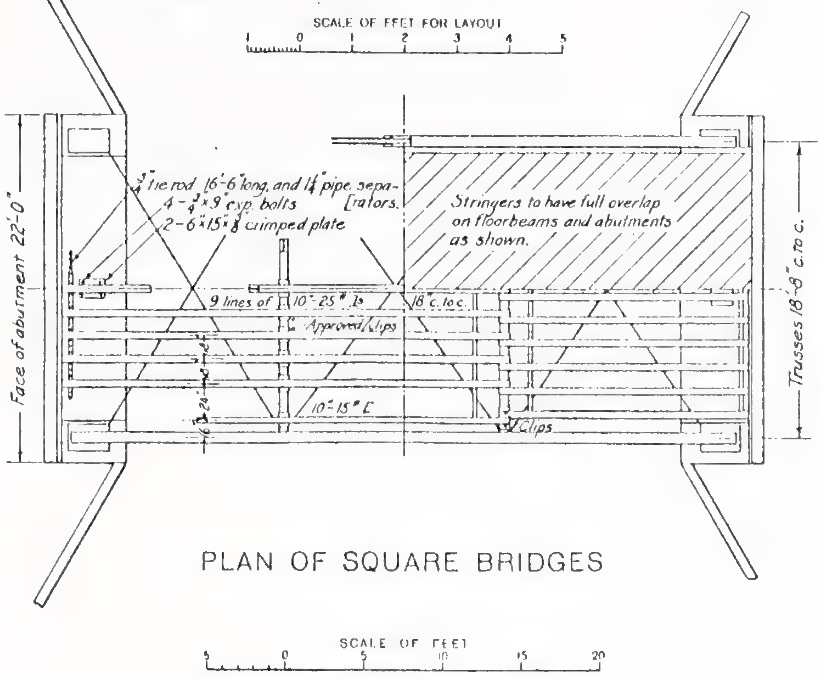
WROUGHT IRON CLIP

DETAIL OF FLOOR FASTENING

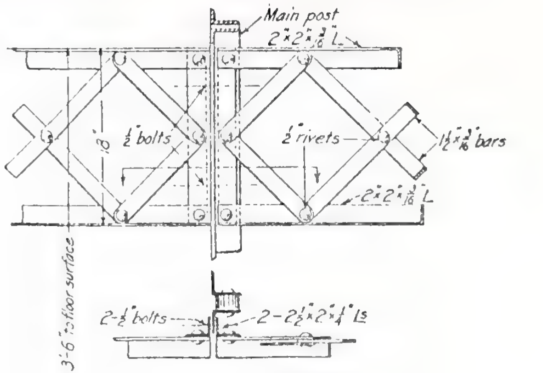
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
F. H. NEWELL DIRECTOR A. P. DAVIS CHIEF ENGINEER
LOWER YELLOWSTONE PROJECT MONTANA
STEEL STRINGER BRIDGES
DESIGN AND COMPILATION BY THE TECHNICAL SECTION
SPECIFICATIONS NO. 136
H. N. SAVAGE SUPERVISING ENGINEER FRANK E. WEYMOUTH PROJECT ENGINEER
ACCESSION NO 9286 DRAWING NO 2 OF 6
MARCH 1907


Span measured c. to c. of end pins
Top chord and side post as per table
A
A
B
B
2-[
¼"x1½" lattice bars at 60°
Batten plates ⅜" thick
¼"x1½" lattice bars at 60°
2-eye bars as per table
Height as per table
2-[
Rivets with separating washers ½" thick, about 22" c. to c.
2-[3"x2½"x¼"
Sway brace and lattice guards not shown
1-1¼" dia. adjustable counter with upset ends and sleeve nut
¾" bolt
4"x6" felloe guard
2"x4"x6" shims 6'-0" c. to c.
3"x12" flooring laid at 45° with ¼" joints
Eye bars as per table
Joists - 9 lines of 10"-25# I's spaced 18" c. to c. and 2 lines of 10"-15# [spaced as shown
2-eye bars 2"x⅜"
2-eye bars 2¼"x⅜"
2'-0"
10"
17"
22"
3"
1¼" bolts 2'-0" long
10" c's.
2'-3"
3'
About 5'-0" to water surface
1⅛" cotter pin
Laterals ⅞" round adjustable thruout
Hanger 1⅛" dia. upset ends with washers and nuts
20"-65# floorbeam
2-4"-5¼# [15" long bored in upper flange and center for ¾" bolts, furnished with nuts and washers
¼"x5" square washer
Upset ends
Abutments will be furnished by the United States
HALF ELEVATION
18'-8" c. to c.
18'-0" clear
¾" bolts with nuts and washers
⅜"x10"x12" plate
1¼" standard water pipe
Height as per table
Height 3
Pins as per table
¾" tie rod
2-2"x2½"x¼" L's
⅜"x7"x12" plate
¾" bolts with double nuts and washers
20"-65# floorbeam
Bolts
HALF SECTION A-A
9"x¾" exp. bolts here if required
¼"x15"x¼" plate under each pedestal end resting on abutment
3"x2½"x¼" L's
4"x5"x½" anchor plate
⅜"x3" sq. washer
⅜"x12"x16" sliding plate
⅜"x20"x20" sheet lead on masonry
⅜"x18"x18" base plate
Abutment
Note: Washer shown is for the sliding end of truss; for fixed end make washer an integral part of sliding plate thus:
HALF SECTION B-B

SCALE OF INCHES FOR DETAILS ONLY
0 3 6 9 12



PLAN OF SQUARE BRIDGES

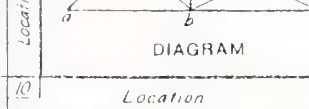


LATTICE GUARDS

WORKING UNIT STRESSES FOR STEEL, IN POUNDS PER SQUARE INCH						
	Tension	Compression	Shear	Bearing	Columns	
Rolled sections	16 000	16 000	9 000	16 000	$\frac{12\,500}{1+\frac{1}{a}\cdot\frac{L^2}{R^2}}$	L÷R = length ÷ radius of gyration, both in inches. a = 36 000 for square ends. 24 000 for one pin end, one square end. 18 000 for pin ends.
Pins	20 000	20 000	10 000	20 000		
Bolts	16 000	16 000	6 000	12 000		
Rivets field			7 500	15 000		
Rivets shop			10 000	20 000		

Wood, safe unit tension or compression, 1000 pounds per square inch.

GENERAL DATA					MAIN TRUSS MEMBERS				
No. of bridges	Span-feet	Height-feet	No of panels	Camber-inches	2-[min sec and 1-plate min sec. Ex. 2-C-8"[and 1-8"x¼" plate	2 eye bars	1 eye bar for 40 ft. span, 2 for other spans	Diam of all pins	Location
1	2	3	4	5	6	7	8	9	10
	l	h	n	c	aABC	Ab	Cb	d	Location
[illegible]	40	6.5	3	[illegible]	6"-8" [illegible]	[illegible]	[illegible]	2"	Stations 2549 and 2879
[illegible]	52	7.5	4	[illegible]	6"-9" [illegible]	[illegible]	[illegible]	[illegible]	Stations 1610 (Simard), 2126 and 2260
[illegible]	56	8.0	4	[illegible]	7"-10" [illegible]	[illegible]	[illegible]	2¼"	Stations 970, 1307, 1507, 1893, 2126 and 2260
[illegible]	60	8.0	4	[illegible]	7"-10" [illegible]	[illegible]	[illegible]	2½"	Stations 295 (school house), 460 and 750



DIAGRAM

DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
F. H. NEWELL DIRECTOR A. P. DAVIS CHIEF ENGINEER
LOWER YELLOWSTONE PROJECT MONTANA

TYPICAL STEEL PONY TRUSS BRIDGE

DESIGN AND COMPILATION BY THE TECHNICAL SECTION
SPECIFICATIONS NO. 136
H. N. SAVAGE SUPERVISING ENGINEER FRANK E. WEYMOUTH PROJECT ENGINEER
ACCESSION NO 9287 DRAWING NO 3 OF 6
MARCH 1907

MONTANA BRIDGE INVENTORY FORM
(Replaces SHPO Form 190)

Site Number: *24DW 266* Site Name: *War Dance Coulee Main Canal Bridge*
Structure Number: *L11311 003+01001 073-C* Year Built: *1907*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *NE¼NW¼NE¼, Sec. 9 T. 18 R. 57 E.*
UTM Zone: *13, 54105 E. 5242828 N.*
Quad Name: *Savage SW, Mont.* Scale: *1:24,000*
County/City: *Dawson* Route *311* Mile Crossing *USRS Main Canal*

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Dawson County

PRESENT USE: *Canal Bridge*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
    X Pin connected
    __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
X Pony
__ Through
__ Combination

TRUSS DESIGN

__ King Post
__ Queen Post
__ Howe
X Pratt
    __ Double Intersection
    __ Half Hip
    __ Parker
    __ Camelback
    __ Pennsylvania (Petit)
        __ Sub Struts
        __ Sub Ties
    __ Baltimore
__ Lenticular
__ Warren
    __ Verticles
    __ Polygonal Chord
    __ Double Intersecting
    __ Quadrangular
    __ K
__ Other

Length *60'* Width *18'* No. spans *1* No. panels *4*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, Francis E. Weymouth, Chief Engineer* Fabricator *Carnegie Steel* Builder/Contractor *A.Y. Bayne & Co., Minneapolis, MN*

PHOTOGRAPHIC RECORD

Roll 11, Frame 4

NARRATIVE DESCRIPTION

This pin-connect Pratt Pony truss is 60' long, 18' wide, and 8' high. The single span rests on concrete abutments. Design Specifications No. 136, drawing 3 of 6, detail the main truss members, as does bridge inspection notes, appended to this form. The lower chord is composed of two eyebars connected with 2½" pins (the largest pin size found on the pony trusses on this project). A "U" shaped hanger supports the floor beam-stringer system. The upper chord is composed of a steel plate riveted to two channel sections with lattice bars riveted to the bottom flanges. The verticals are two angle sections riveted together with batten plates, while the diagonals are two forged steel eyebars with turnbuckles. The running surface is wood plank. No paint remains on the members, which are rusted.

NARRATIVE HISTORY

(For general information on the Lower Yellowstone Project - USRS Main Canal, please see the overview.) The USRS Annual Project History Through 1909, Volumes I and II, describes this site as Station 295, also known as "School House" and as "War Dance Coulee" bridge. The design is recorded as Specification 136, Drawing 3 of 6, A.Y. Bayne and Company got the contract to build this bridge as one of the first three built on the project, and the first in a long line of structures across the canal. Under Contract No. 196, Bayne reported using 38,262 pounds of steel and 3,600 feet of lumber. He paid a total of $141.75 in wages. Per ten hour day the foremen were paid 5 and 6 dollars, the carpenters 4 and 4.50. Drivers with their own teams got 2.50, while laborers made 2.25. Fabrication was the bulk of the $1,765.70 cost at $1,583.52. USRS estimates their cost of engineering and inspection at $100, and they paid $122.45 to have the materials hauled. The total cost of the project was $1,988.15.

Bayne bid $7,026.70 to complete three bridges (War Dance, Lackeys and Pettigrove) and was scheduled to complete them by July 18, 1907. He finished early and charged $6,969.01.

INTEGRITY *Good. Guardrails do not extend beyond the inclined end posts, but likely they did when built. The bridge was repaired in 1970, and rated 70.5 for sufficiency in 1986. It is in good condition.*

Altered Unaltered X Moved Date
Summary of Move:

SIGNIFICANCE

The bridge is significant as the first built on the USRS Main Canal, and the longest pony truss on the project.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 18, 1988*

Was Archaeological survey conducted around the structure?

Yes __ No _X_

Results negative __

Comments: *Canal and road construction so altered the terrain that an archaeological survey would not yield intact resources.*

Was historical/architectural survey conducted around the structure?

Yes __ No _X_

Results negative __

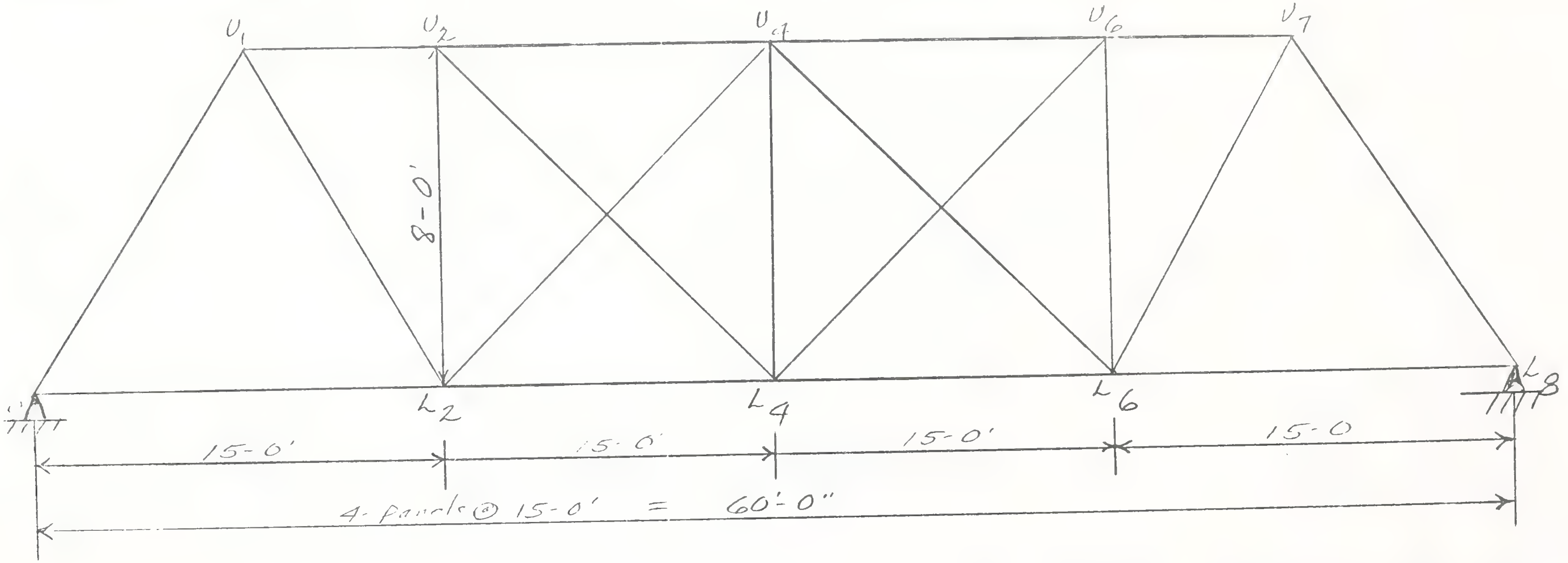
Comments:

EV:1:kw:255k

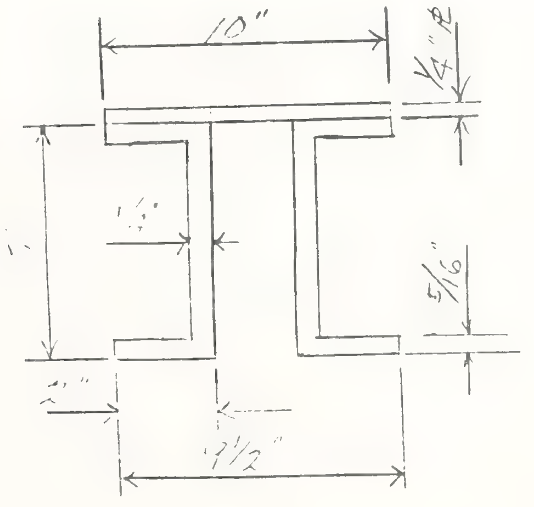
SIP. NO. [illegible] USBS Main Canal Ken Quirk & D Kaufmann 5-30-7[illegible]

Sheet 1 of 3

[illegible] Measurements:

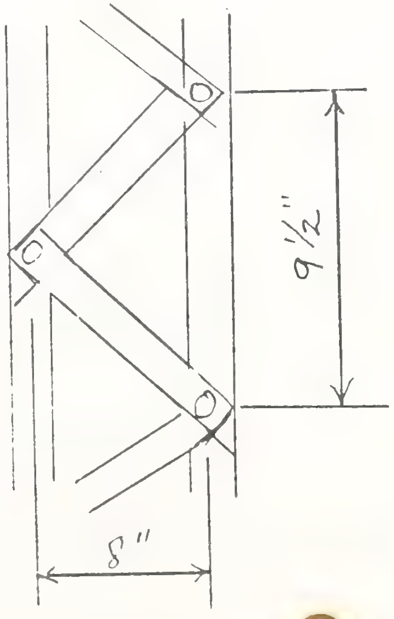


From Center of upstream Truss to Center of down stream Truss = 18'-10"



[illegible] Top Chord

[illegible] (U1 U2, U2 U4).



→ 1 1/2 1/4 Lacing

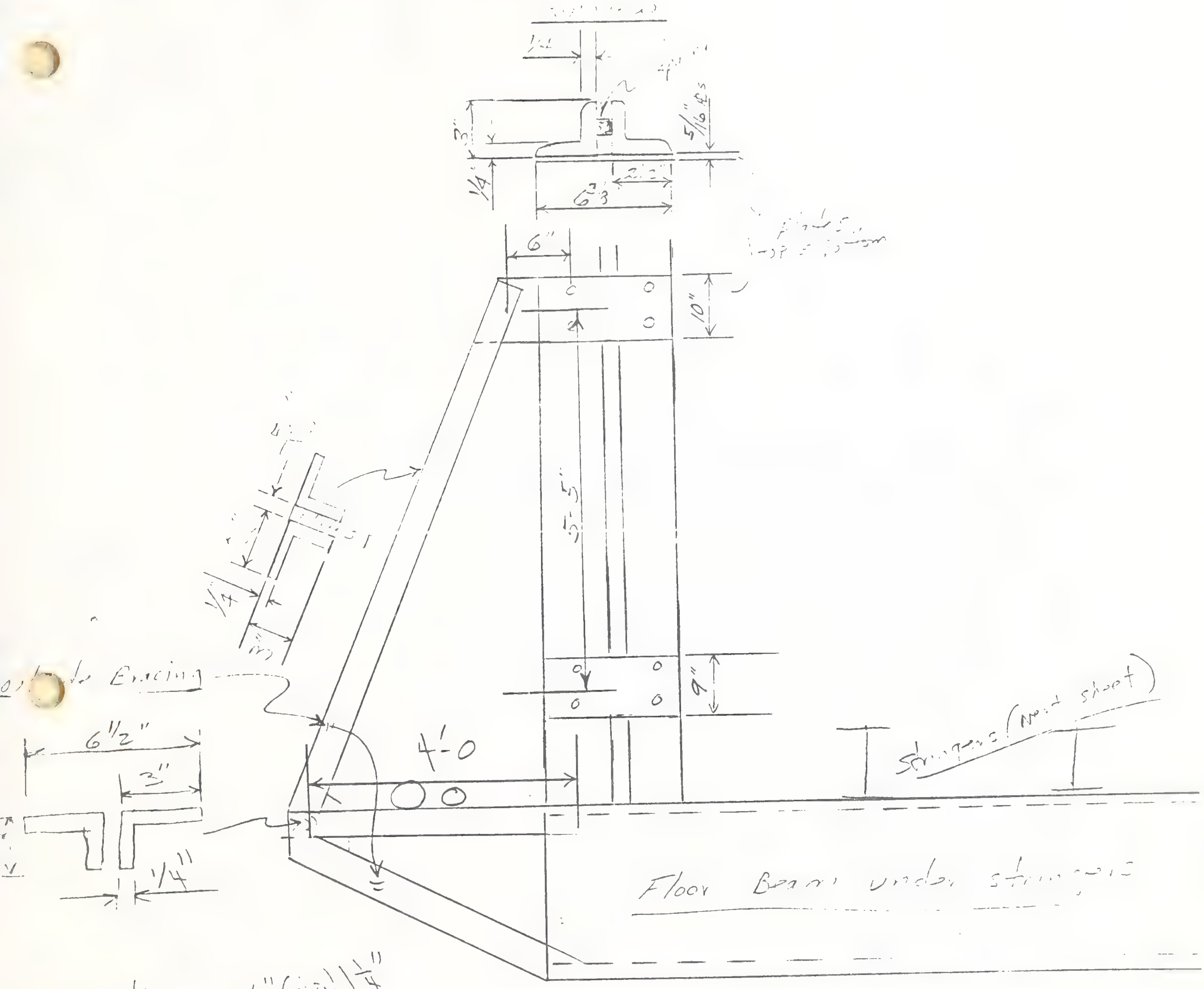
(L0 L2; L2 L4; L4 L6; L6 L8;

2-eye bars 2 1/2" x 5/8")

(U1 L2; L6 U7): 2-eyebars 2 1/2" x 3/4"

(U2 L4; L4 U6): 2 eyebars 2" x 1/2"

(L2 U4; U4 L6): 1-1 1/4" square Rod



Vertical Members & outside Brace
(U_2L_2; U_4L_4; U_6L_6):

Floor Beam: I-Beam 19'-8" Long, Depth = 20".
Flange width = 6 1/2", Web thickness 5/8",
Avg Flange thickness = 11/16".

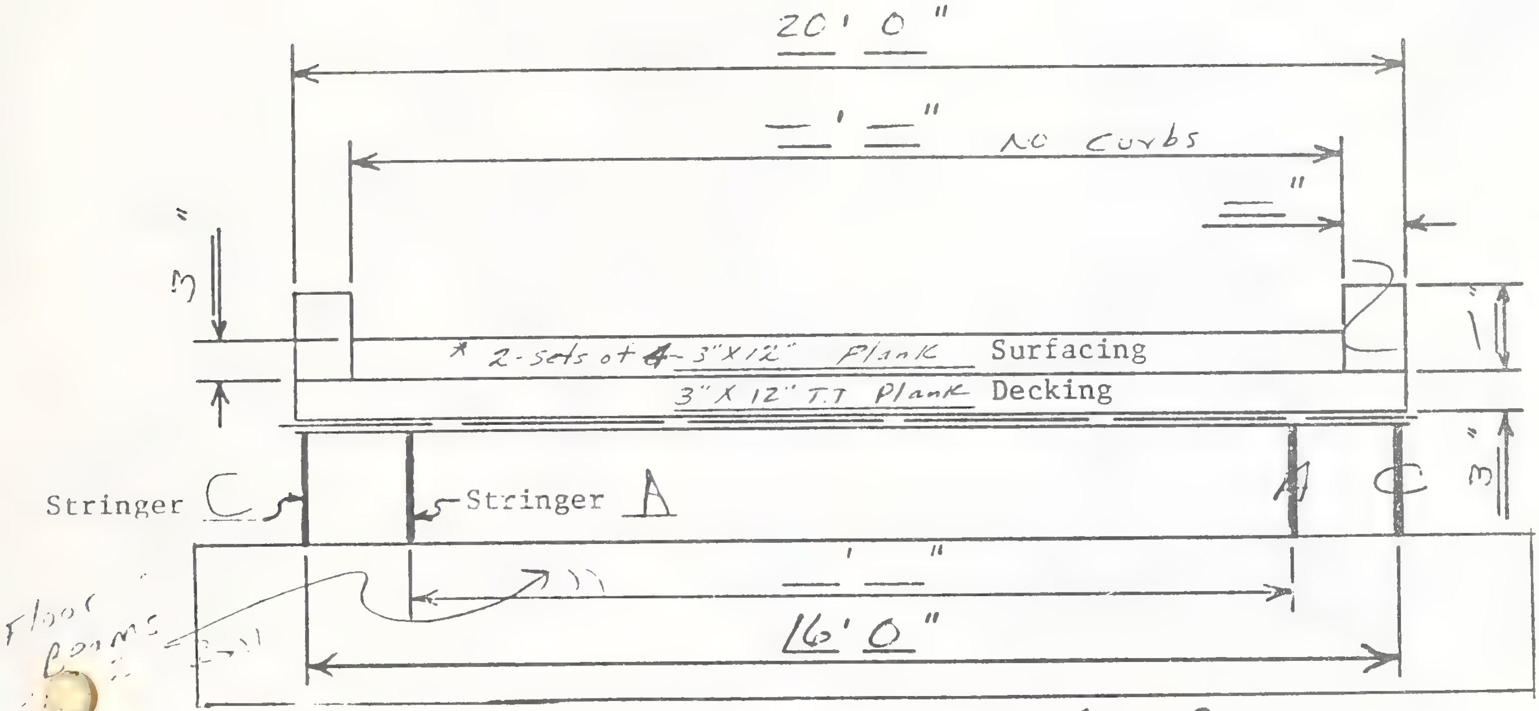
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number L11157 0004 0.610 Span(~~s~~) 1

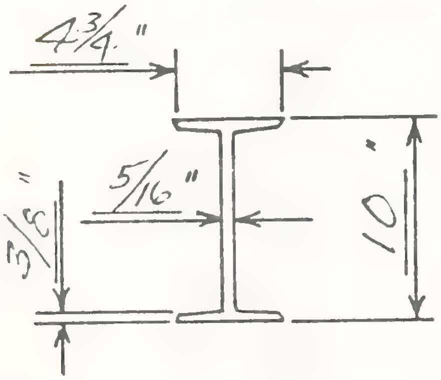
Inspector K.G.

Date 5-30-79

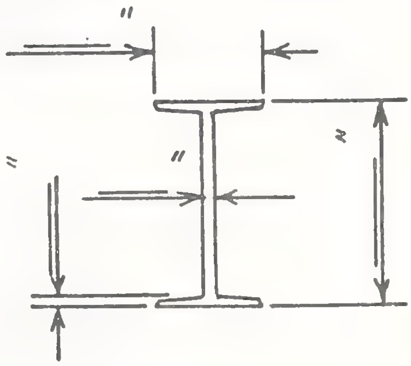


9 Stringers (total)

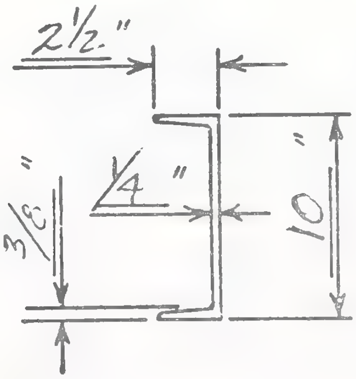
Span Length 60' 0"



STRINGER "A"

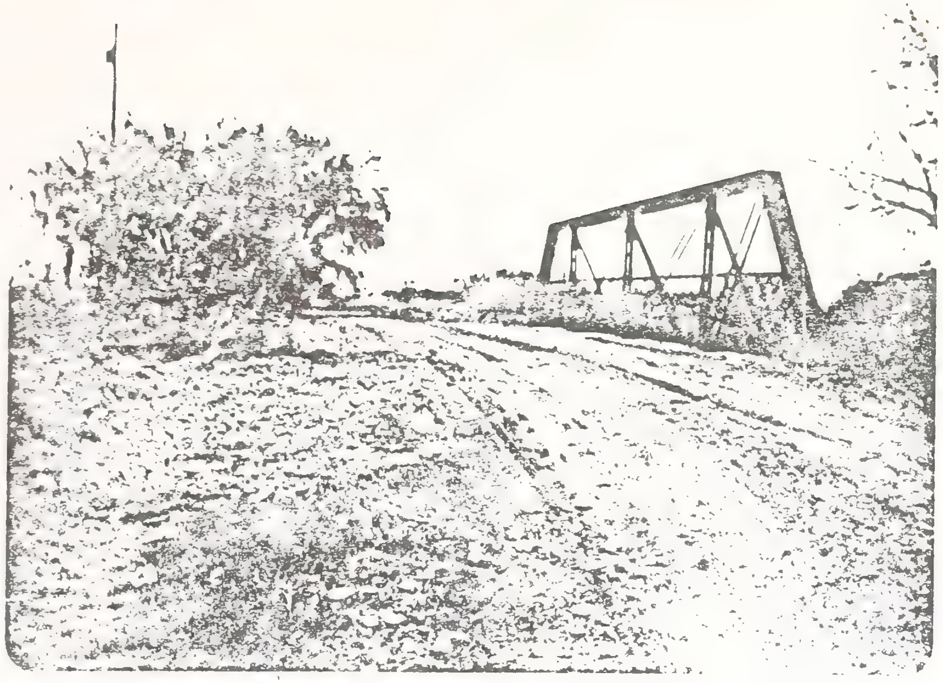


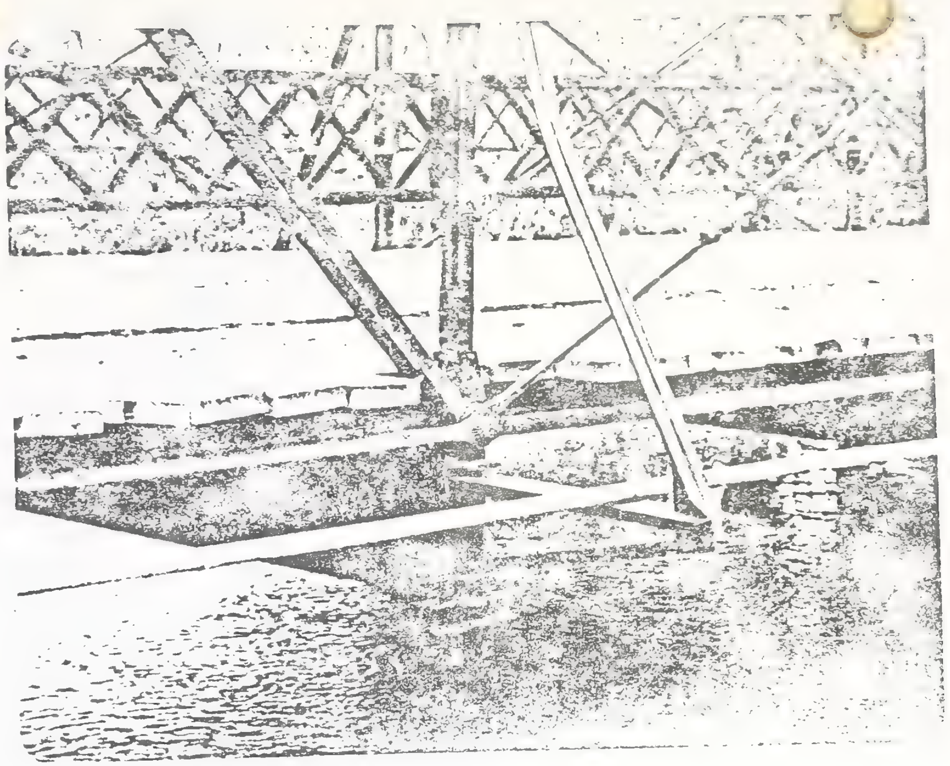
STRINGER "B"



STRINGER "C"

Comments: 2-sets of 4- 3"X12" Running Plank (wearing surface)
stringers - Good Condition.





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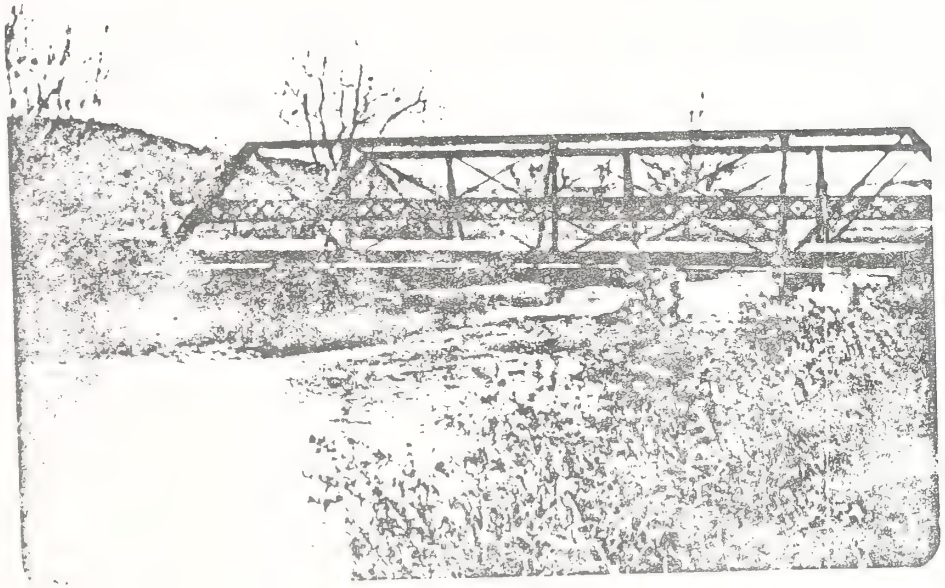
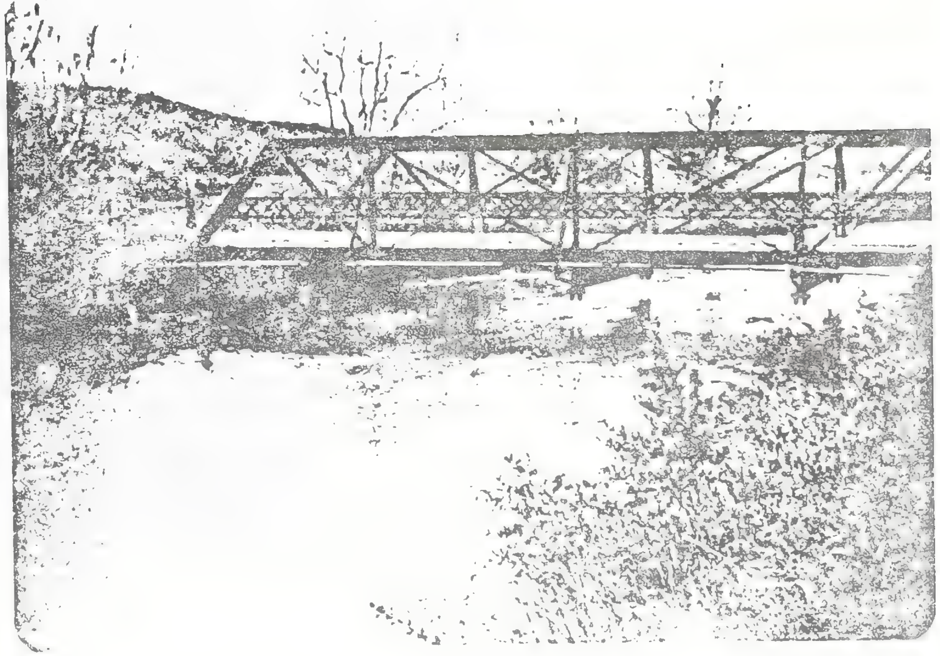
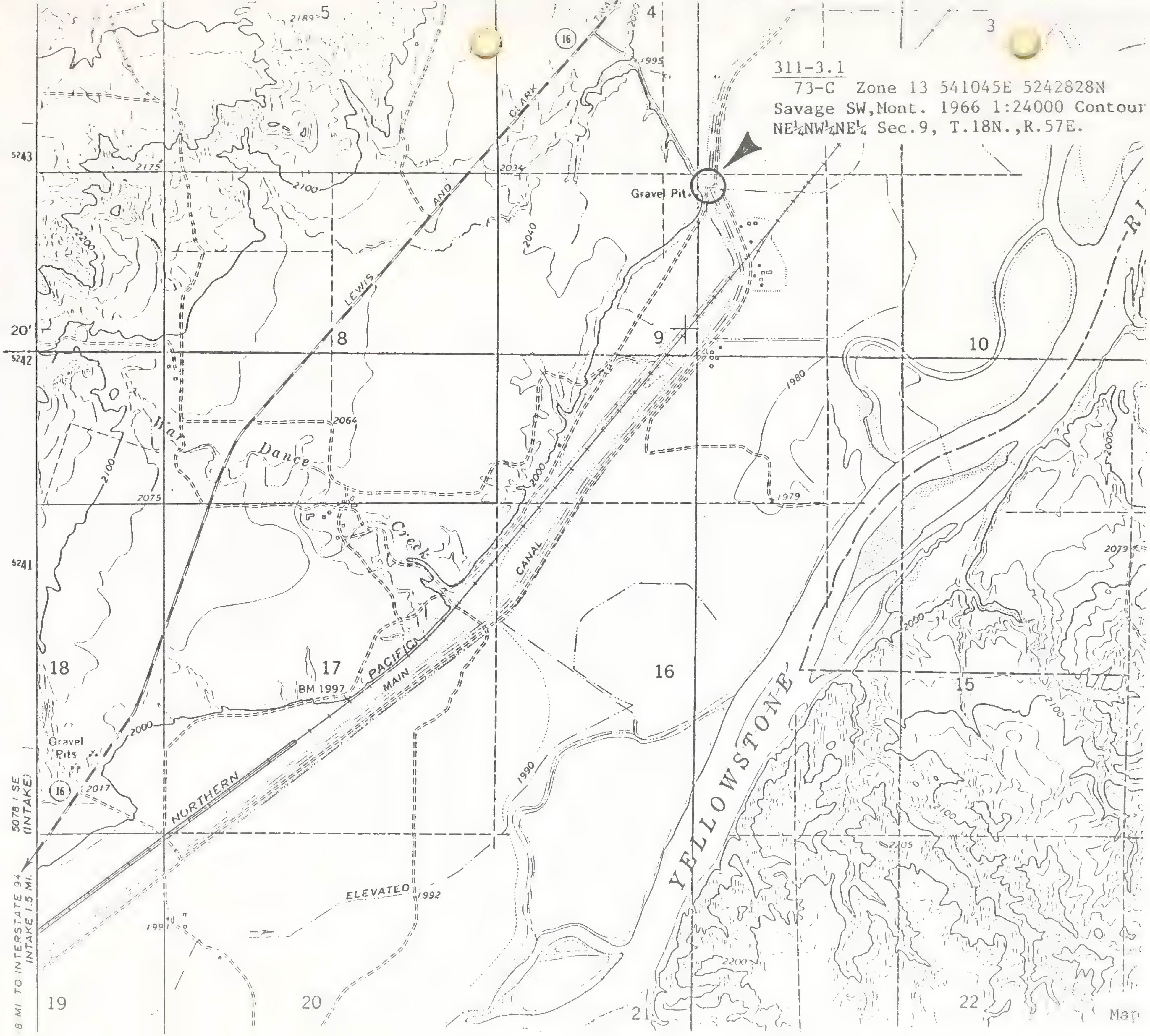


2



311-3.1
73-C Zone 13 541045E 5242828N
Savage SW,Mont. 1966 1:24000 Contour
NE¼NW¼NE¼ Sec.9, T.18N.,R.57E.



MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL188* Site Name: *USRS Canal Bridge*
Structure Number: Year Built: *1908*
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *NE¼NW¼NE¼, Sec. 35 T. 19 R. 57 E.*
UTM Zone: *13, 544380 E. 5246025 N.*
Quad Name: *Savage SW* Scale: *1:24000*
County/City: *Richland* Route Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Richland

PRESENT USE: *Crosses USRS Main Canal on county road giving residents east of the canal access to route 16 west of the canal.*

BASIC BRIDGE (check as appropriate)

- __ Beam, Slab, Girder
- __ Suspension
- __ Arch
- __ Movable
- X Truss
  - X Pin connected
  - __ Rigid

MATERIALS

- __ Wood
- X Metal
- __ Combination
- __ Stone
- __ Reinforced Concrete
- __ Prestressed Concrete

TYPE

- __ Deck
- X Pony
- __ Through
- __ Combination

TRUSS DESIGN

- __ King Post
- __ Queen Post
- __ Howe
- X Pratt
  - __ Double Intersection
  - __ Half Hip
  - __ Parker
  - __ Camelback
  - __ Pennsylvania (Petit)
    - __ Sub Struts
    - __ Sub Ties
  - __ Baltimore
- __ Lenticular
- __ Warren
  - __ Verticles
  - __ Polygonal Chord
  - __ Double Intersecting
  - __ Quadrangular
- __ K
- __ Other

Length *58'* Width *17½'* No. spans *1* No. panels *4*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *US Reclamation Services, A.P. Davis, Chief Engineer*
Fabricator Lackawana Steel

Builder/Contractor *Minneapolis Steel and Machinery Co., Minneapolis, MN*

PHOTOGRAPHIC RECORD

Roll 11, Frame 3

NARRATIVE DESCRIPTION

Plans for this bridge are found in specifications 136, Drawing 3 of 6. This single span, 58' pin-connected, Pratt Pony truss has 4 panels measuring 14½' each. It is 17½' wide and 8½' tall. The lower chord is forged steel eyebars connected by 2½" pins to vertical members of two angle sections riveted together with lacing bars. The top chord is a continuous steel plate riveted to two channel sections with lacing bars connecting the bottom flanges. Diagonals or tension members are two eyebars or eyebars with turnbuckles. Knee braces are riveted at the I-beam floor beam and to an 8½" plate near the top of the verticals. The floor beam - stringer system is comprised of eleven 10" steel stringers. A lattice guardrail stands 3½' from the deck. The deck is wood plank and the roadway is dirt and gravel.

NARRATIVE HISTORY

This is the longest Minneapolis Steel and Machinery Company bridge on the canal. While it is number 3 in terms of the USRS canal bridges counting from the Intake north down the canal, it is the first Minneapolis Steel and Machinery bridge that one encounters. Build at Station 460, it was originally planned to be one of three 60' spans. The first, Station 295 (24DW266), ended up being the War Dance Coulee bridge built by A.Y. Bayne in 1907 as a part of the first three built on contract. The next station, 750, was built by Minneapolis Steel and Machinery Co. (24RL167), but is 56' long. Drawing three shows the dimensions and the station locations for the bridges as originally planned. None were planned at this length, 58'. Plans on bridge lengths had to be altered once the canal was built past the site in order to fix the crossing exactly.

INTEGRITY *Very good*

Altered Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

This bridge has historic significant as one of the USRS Canal Bridges on the Lower Yellowstone Project. It is the first Minneapolis Steel and Machinery Co. one encounters on the canal and is the longest Pratt Pony truss built by that company on this project. It appears to be eligible for listing on the National Register.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Arnold Prochnow* Date: *February 18, 1988*

Was Archaeological survey conducted around the structure?

Yes __ No _X_

Results negative __

Comments: *Canal construction so altered the terrain that the location of intact archaeological remains is very remote. A survey is not recommended.*

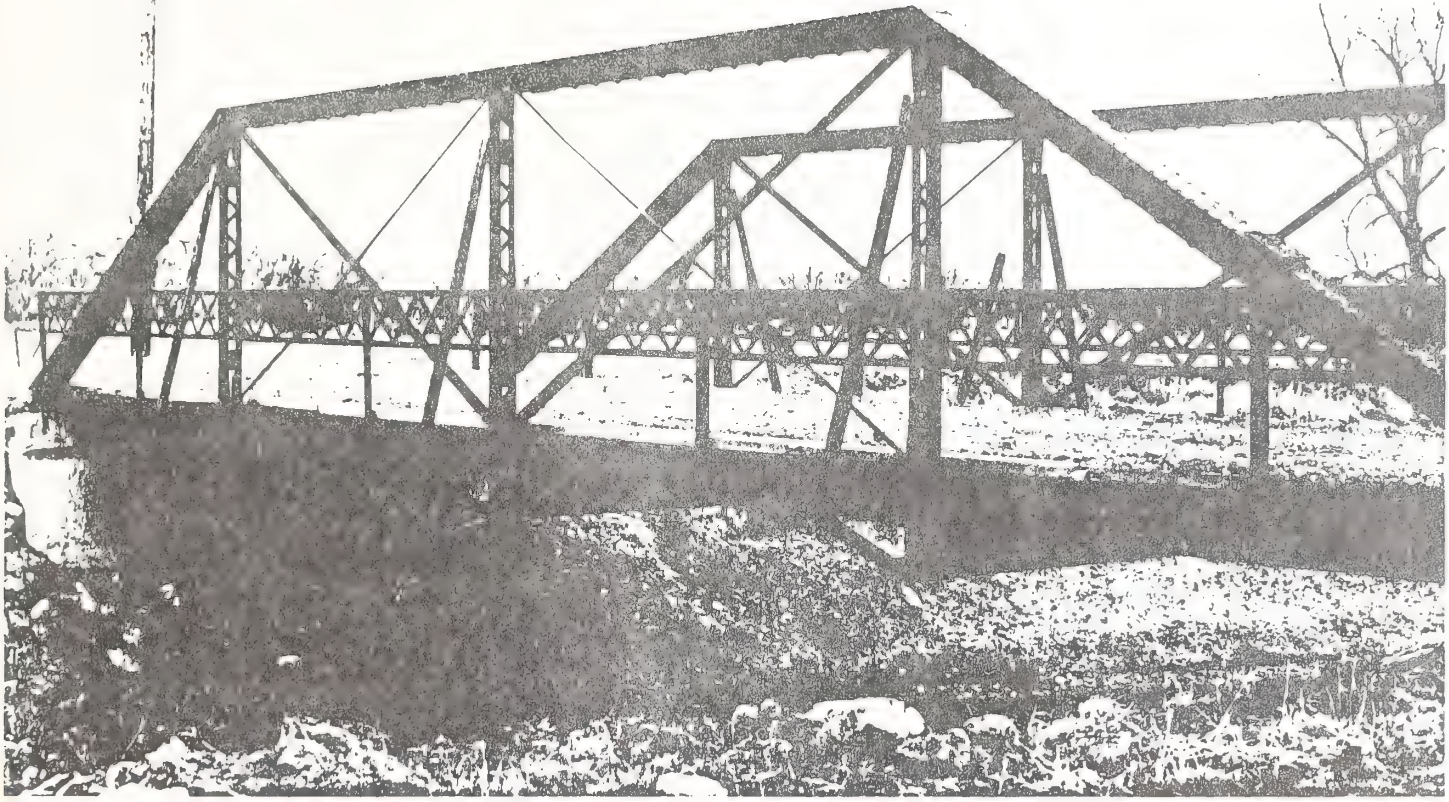
Was historical/architectural survey conducted around the structure?

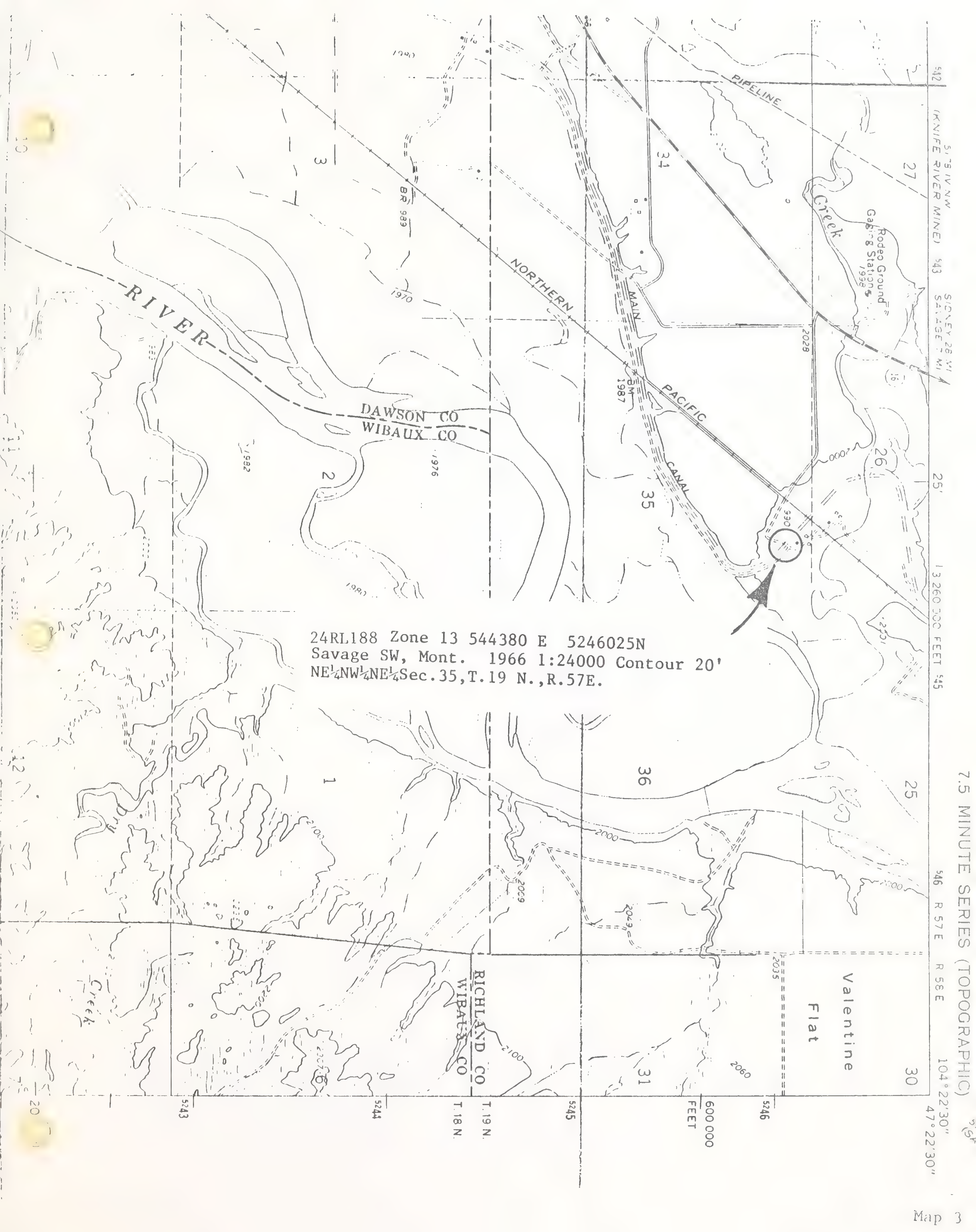
Yes __ No _X_

Results negative __

Comments: *The quadrangle map (1966) shows properties to the northwest (east side of the canal). These were not examined.*

EV:1:lrk:2551





24RL188 Zone 13 544380 E 5246025N
Savage SW, Mont. 1966 1:24000 Contour 20'
NE¼NW¼NE¼Sec.35,T.19 N.,R.57E.

Map 3

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL* 163 Site Name: *Lackeys, USRS Canal Bridge*
Structure Number: *L42 335 000+0.700-1 001-C* Year Built: *1907*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *NW¼NE¼SE¼, Sec. 34 T. 19 N., R. 57 E.*
UTM Zone: *13, 542985 E. 5245160 N.*
Quad Name: *Savage SW, Montana* Scale: *1:24,000*
County/City: *Richland* Route *335* Mile Crossing *USRS Main Canal*

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Richland County

PRESENT USE: *USRS Main Canal Bridge*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
  X Pin connected
  __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
__ Pony
X Through (Laminated Wood and Gravel Deck)
__ Combination

TRUSS DESIGN

__ King Post
__ Queen Post
__ Howe
X Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
__ K
__ Other

Length *80'* Width *17.4'* No. spans *1* No. panels *5*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne and Co., Minneapolis, MN*

PHOTOGRAPHIC RECORD

Roll 2, Frames 23 and 24

NARRATIVE DESCRIPTION

Plans for this and one other bridge are found under Specifications 136, Drawings 4 and 5 of 6. This 80' pin-connected, Pratt Through truss is 17.4' wide, 16' high, with vertical clearance of 11'. It is situated on a 40° skew. The lower chord is eyebars connected with 3" pins on which are hung the U bolts that support the floor beam-stringer system. The upper chord is a steel plate riveted to two channel sections, the bottom flanges of which are riveted together with lacing bars. The verticals are composed of four angle sections riveted together with lacing bars. Diagonal members are eyebars, and eyebars with turnbuckles. The portal bracing is of two angle sections riveted in place with gussett plates. On the center of the portal is a plate upon which in raised letter is "1907 U.S.R.S." The portal and two inside struts are two angle sections, while top lateral bracing is eyebars. The guardrail is of two angle sections connected with lattice bars. It measured 18" in height.

NARRATIVE HISTORY

Contract 196 for this and two other bridges went to A.Y. Bayne and Company of Minneapolis, Minnesota. Baynes' bid for this skewed 80' span was $2,630.50. Fabrication cost $2,327.03, leaving $53.47 for painting and $250.00 for labor. Steel for the bridge weighted 55,986 pounds and there was 5,000 board feet of lumber. Bayne finished the work on time and at the bid price. This is one of only two 80' through truss spans built on the canal, the other is called the "Pettigrove." Because of the skew, these are the two longest bridges built on the Main Canal of the Lower Yellowstone Project.

INTEGRITY *Good. The structure rated at 60.1 in 1986.*

Altered Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

This is one of two 80', 40° skew, Pratt Through Truss bridges built on the canal, the most sophisticated truss type designed on the Lower Yellowstone Project.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 19, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *The area is extremely altered by the construction of the Main Canal and road.*

Was historical/architectural survey conducted around the structure?

Yes X No __

Results negative X

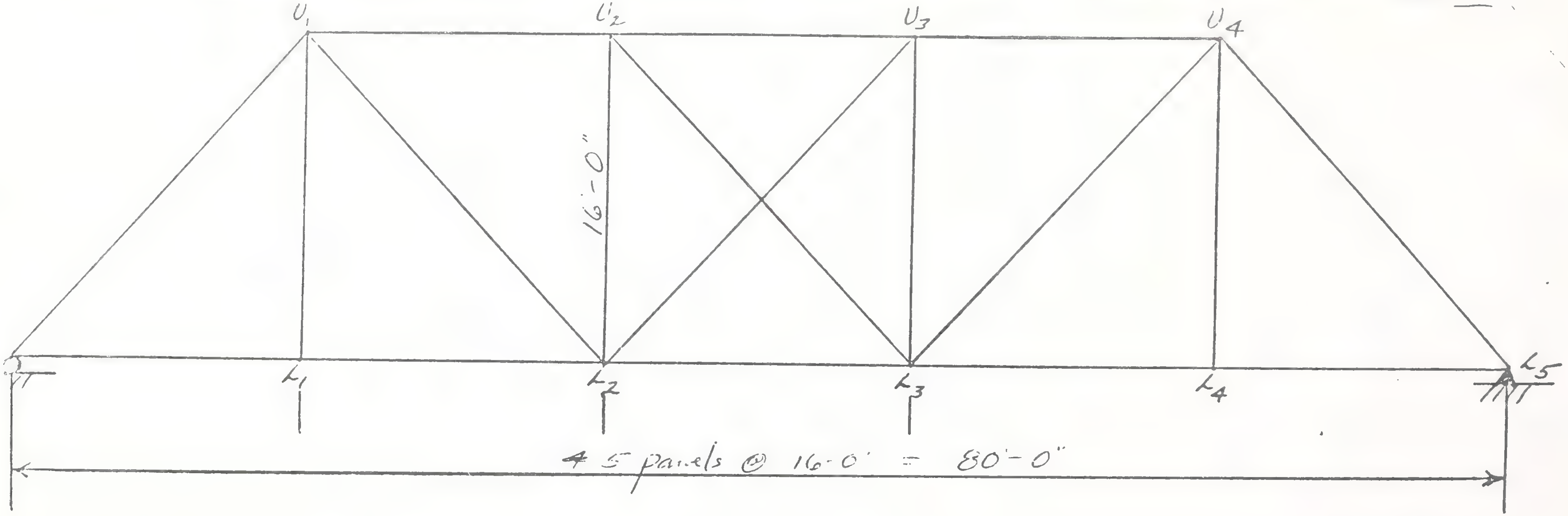
Comments:

EV:cm:3/N

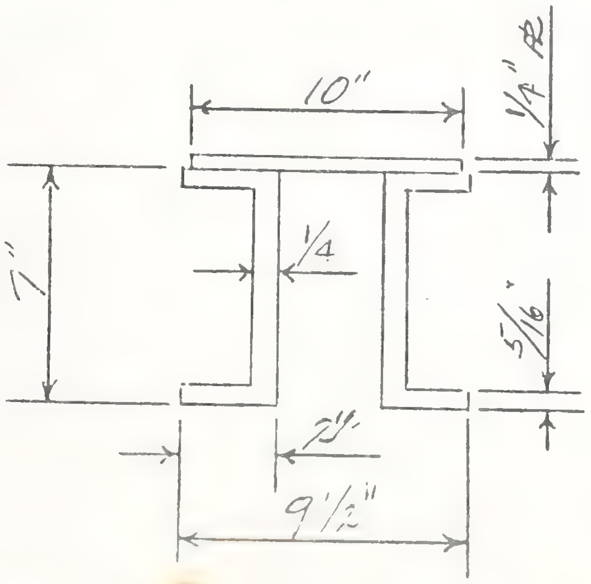
335 - 0.9
L42 ~~32~~ 00040.570 (USRS main Canal) Ken Quale & D Kaufmann

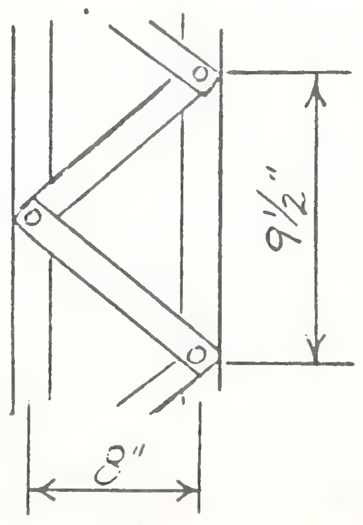
Str. Measurements:

Sheet 1



From center of upstream truss to center of downstream truss = 19'-0"





1/4" x 1 1/2" Strapping (Bottom side)

End Pos & Upper Chord ~

Lower Chord: ~~& Diagonal Bracing~~

L0 L5 : 2- eye bars 3/4" x 2 3/4"

Vertical & Diagonal Bracing:

U1 L1 : 2-eye bars 5/8" x 2"

U1 L2 : 2-eye bars 5/8" x 2."

U2 L3 : 1- 1 1/4" (dia) Rod

U3 L2 : 1- eye bar 5/8" 2"

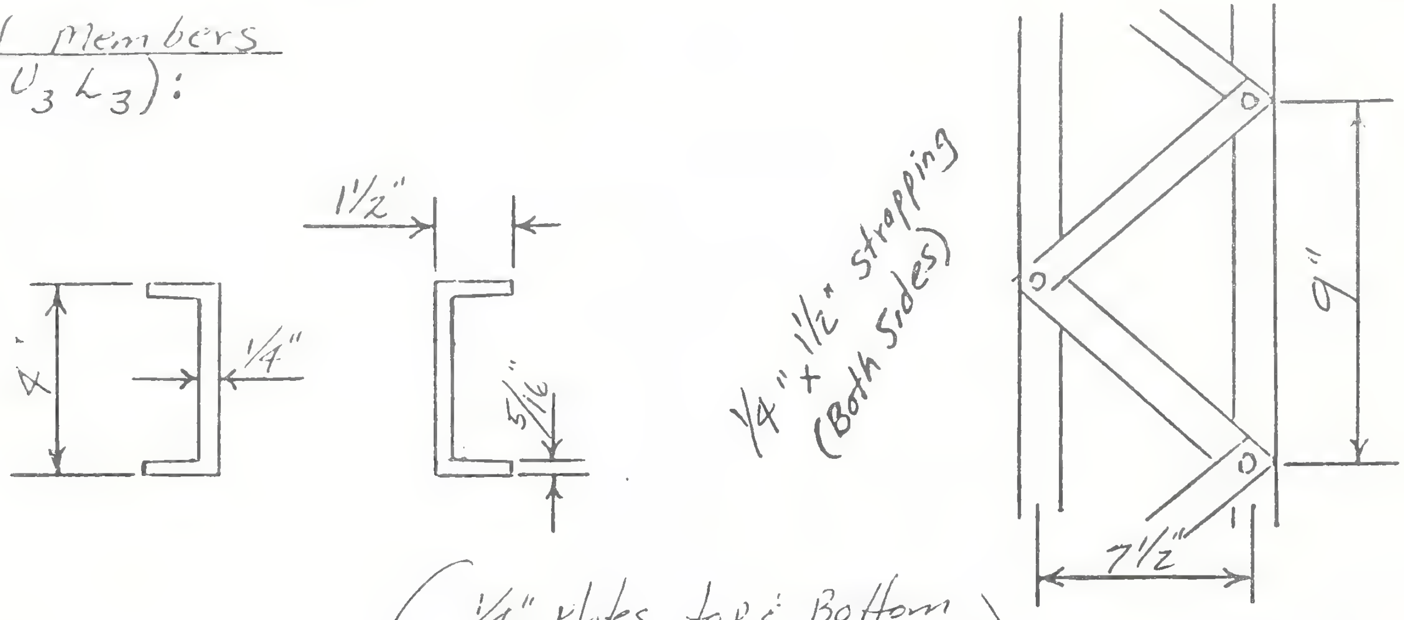
L 42 ~~13E 0067TC.~~ 570 (USRS Main Canal) Ken Geale & D Kaufmann 7-K

335-0.7

Sheet 2 of

Vertical Members

$(U_2L_2; U_3L_3)$:



(1/4" Plates top & Bottom & near Connection points)

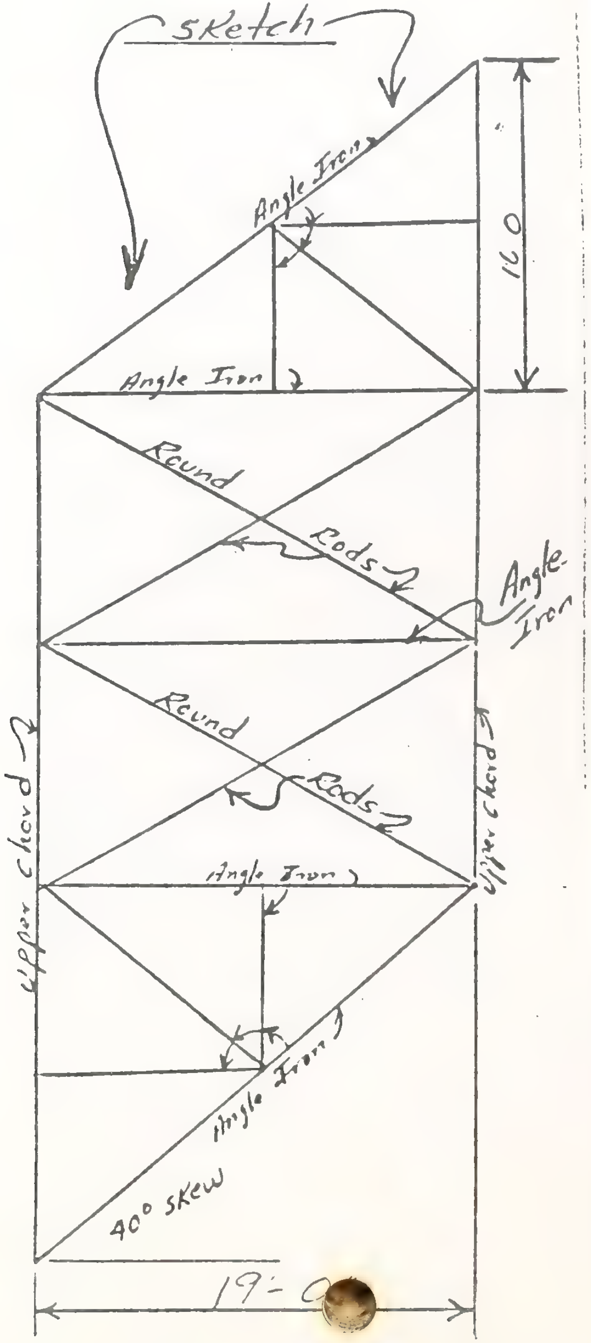
Floor beam: I beam 20' X 0" Long, Depth = 20"

Flange width = 6 1/4"

web thickness = 1/2"

Avg. Flange thickness = 3/4

TOP OF TRUSS BRACING



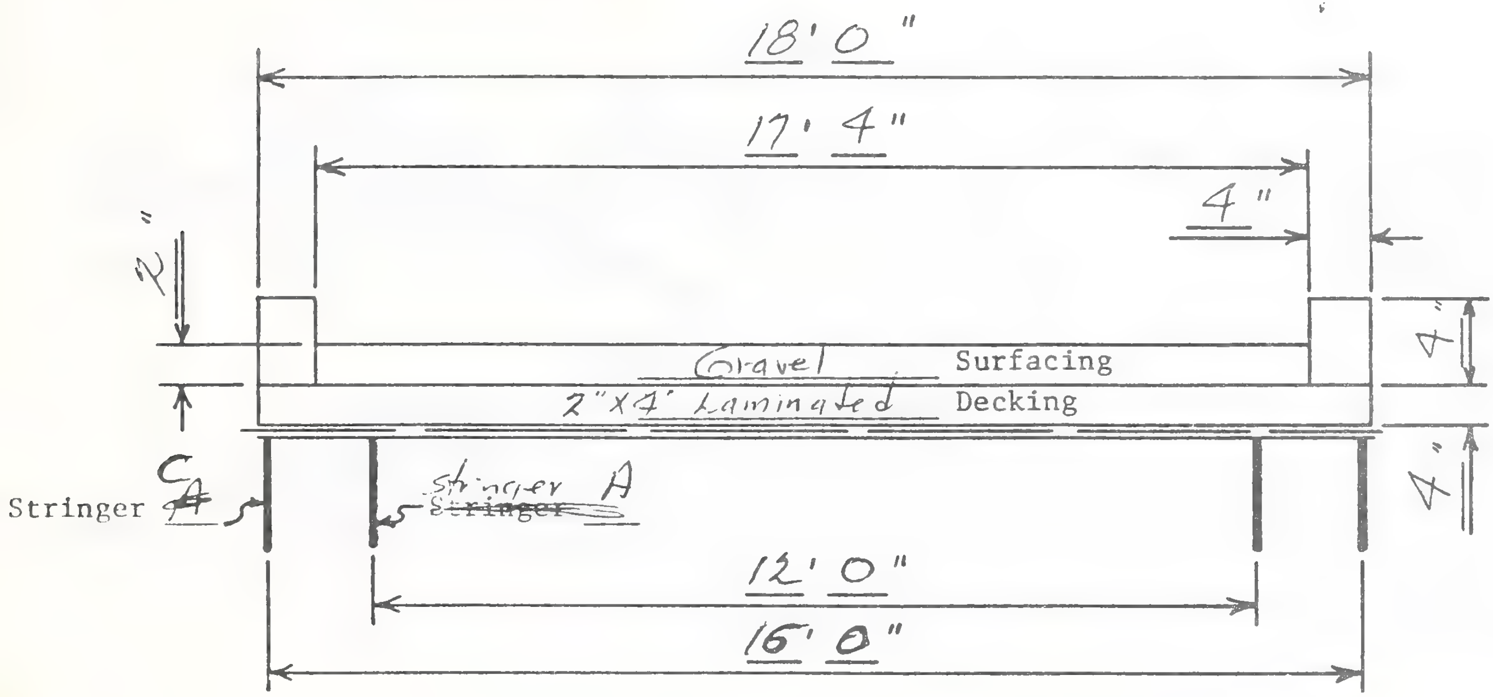
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Structure Number L42335-0.7 ~~L42132 [illegible]~~570 Span(ø) Truss

Sheet 3 of 3

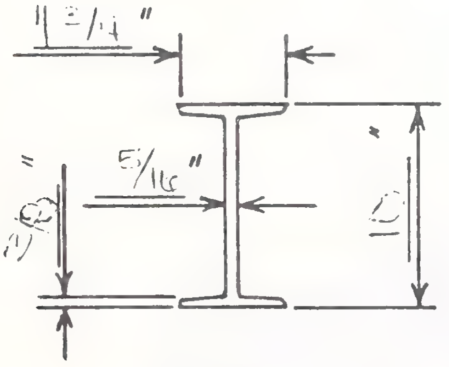
Inspector K.Q.

Date· 7-19-79

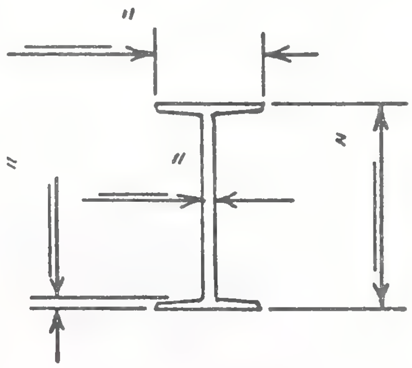


11 Stringers (total)

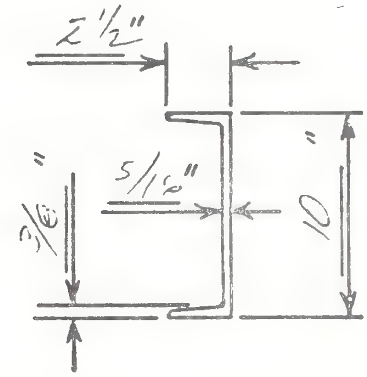
Span Length 80' 0"



STRINGER "A"

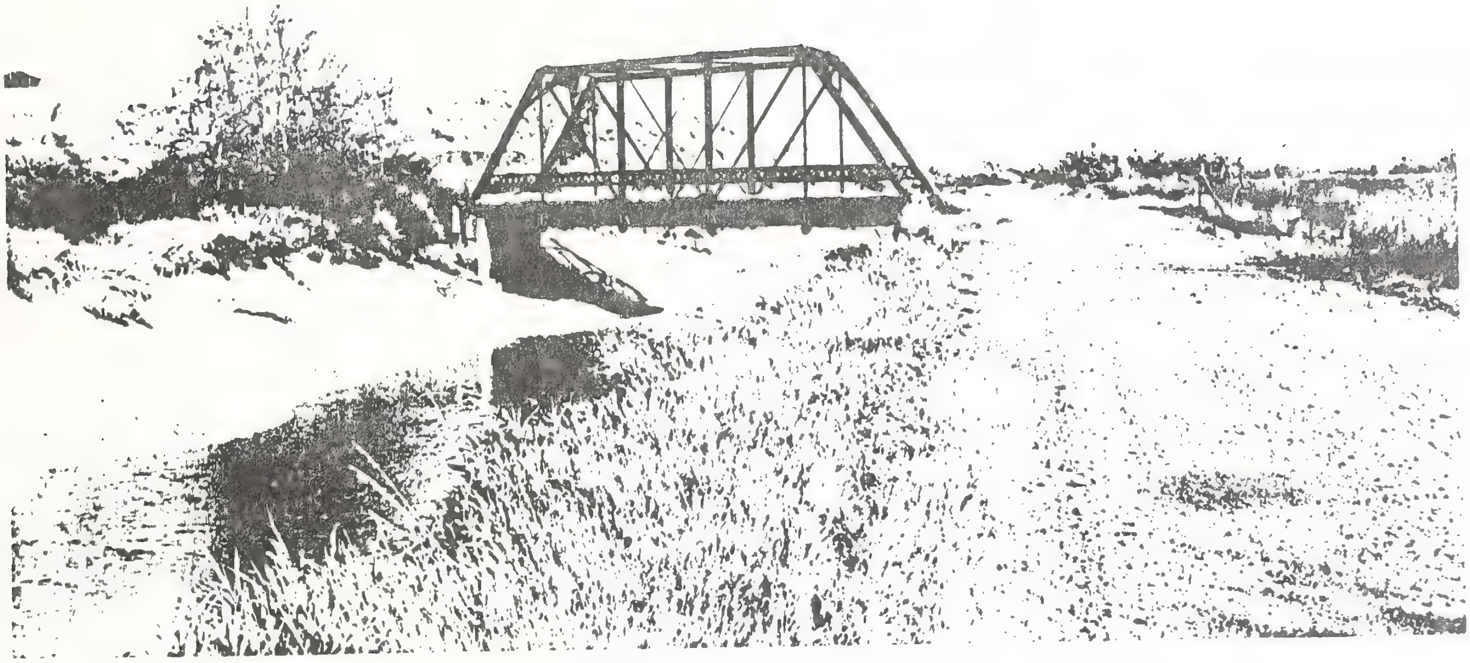


STRINGER "B"

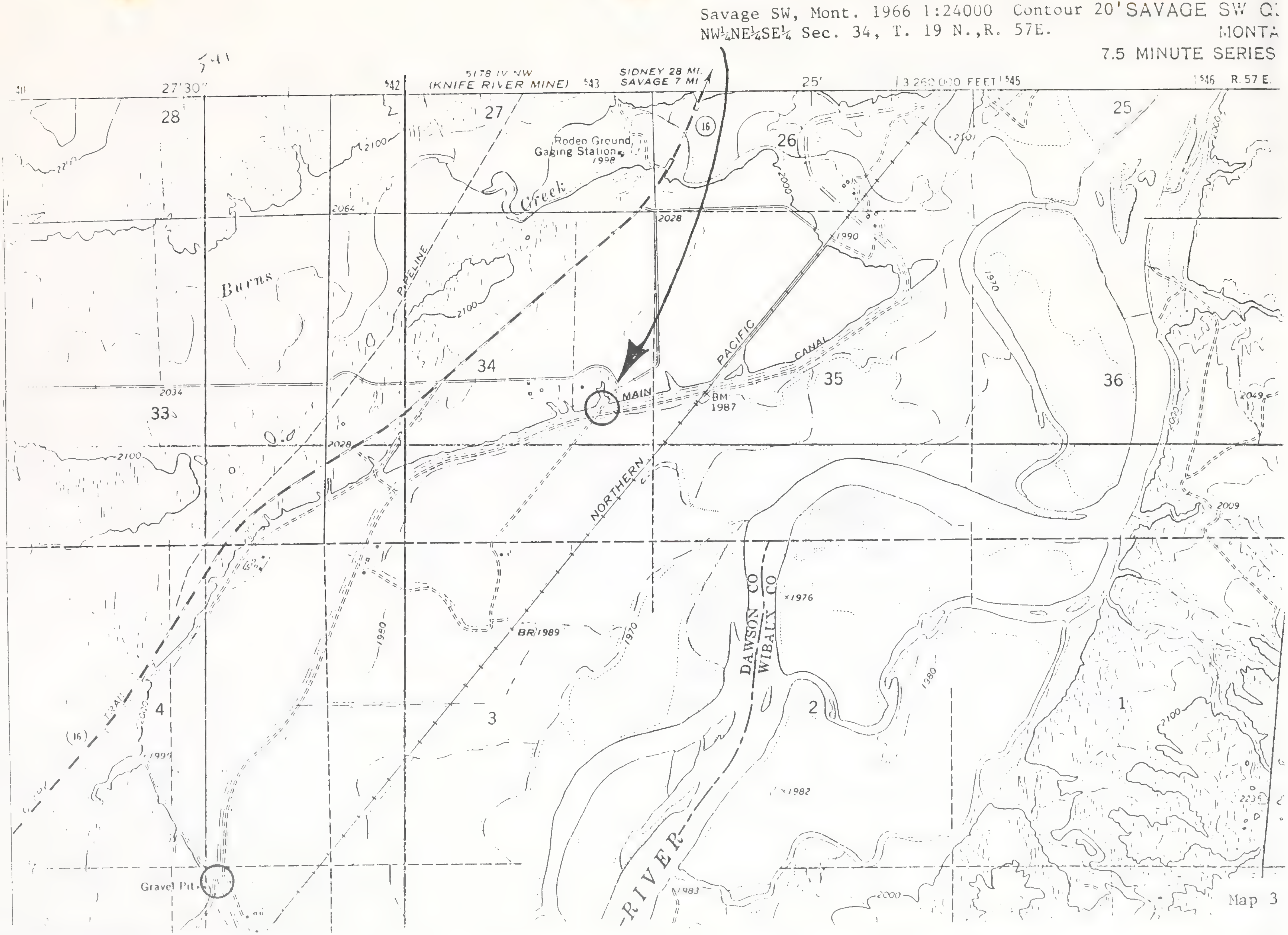


STRINGER "C"

Comments: stringers are in good Condition



335-0.7 24RL163
1-C Zone 13 542985E 5245160 N
Savage SW, Mont. 1966 1:24000 Contour 20'
NW¼NE¼SE¼ Sec. 34, T. 19 N., R. 57E.



Map 3

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL* 164 Site Name: *Burns, USRS Canal Bridge*
Structure Number: *L42 334 000+0.900-1 078-C* Year Built: *1908*
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *SW¼SW¼NW¼, Sec. 25 T. 19 N., R. 57 E.*
UTM Zone: *13, 544900 E. 5247130 N.*
Quad Name: *Knife River Mine, Mont.* Scale: *1:24,000*
County/City: *Richland* Route *334* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Richland County

PRESENT USE: *USRS Main Canal Bridge*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
  x Pin connected
  __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
X Pony
__ Through
__ Combination

TRUSS DESIGN

__ King Post
__ Queen Post
__ Howe
X Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
  K
__ Other

Length *56'* Width *18'* No. spans *1* No. panels *4*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, Francis E. Weymouth, Project Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 2, Frame 21

NARRATIVE DESCRIPTION

This pin-connected Pratt Pony Truss is 4 panels 14' each, totaling 56' in length, 7' high, and 18' wide. It was built from Specifications 136, Drawing 3 of 6 for the typical steel pony truss bridge. The lower chord is two eyebars connected by a 2¼" pin. The incline posts and top chord are metal plates riveted to two channel sections, with lacing bars riveted to the bottom flanges. The vertical members are four angle sections riveted together with lattice bars. Knee laces of double angle sections connect the floor beam to the upper vertical with an 8" gussett plate. The diagonals are forged steel eyebars and eyebars with turnbuckles. They connect to the pints at the verticals. The 11 steel stringers and 3 I beam floor beams are riveted to the *truss* at *various locations. The 18" guardrail is latticed angle sections.*

NARRATIVE HISTORY

A.Y. Bayne and Company of Minneapolis, Minnesota got contract #219 to build light truss bridges across the USRS Main Canal for $17,389. The Schedule 2 listed 4 steel stringer spans and 17 steel trusses. Other records show 20 trusses, and the project map shows 18 locations when light trusses were to be erected. Such contradiction in the record is common. This was to have been a 58' rather than 56' span, according to the record, but the plans (Specifications 136, Drawing 3 of 6), don't show a bridge for this location at all.

The project area was largely unsettled at construction, so bridge sites were based on where the wagon road was cut by the canal, rather than where population warranted one. The siding of Burns was established here, probably about 1912, several years after the bridge was built. A town never developed, however, and the railroad station has since been removed.

INTEGRITY *Good, but load sufficiency is rated at 42.5 as of 1986. The guardrail is incomplete on one end.*

Altered Unaltered Moved *Probably Not* Date
Summary of Move:

SIGNIFICANCE

The bridge is significant as one of the USRS Canal bridges, but has somewhat loss of integrity due to incomplete guardrail.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 20, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *The surface is considerably disturbed by canal and road construction.*

Was historical/architectural survey conducted around the structure?

Yes X No __

Results negative X

Comments: *A modern pump house of concrete block, a circular metal grain storage bin, and a hay stack occupy the bank to the west.*

EV:cm:3/0

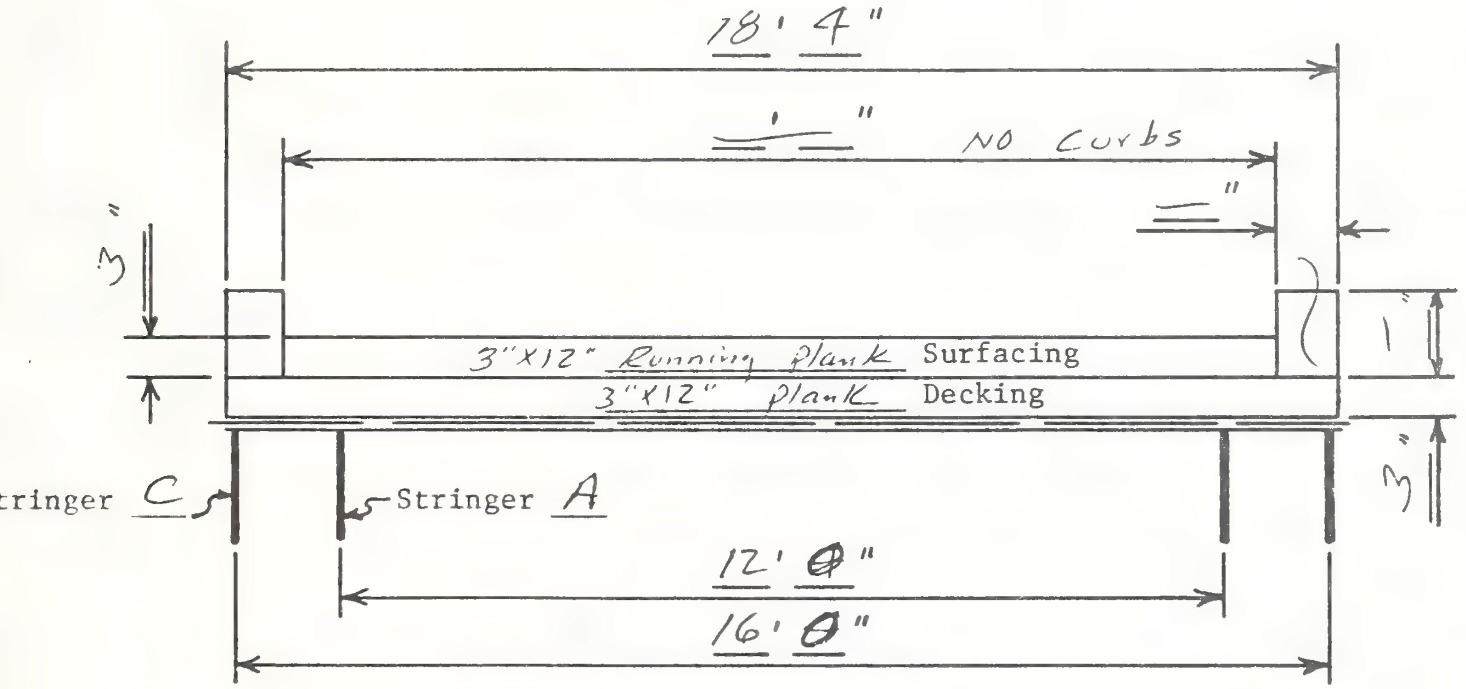
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number L42~~12~~9 339 60010.930 Span(s) Truss

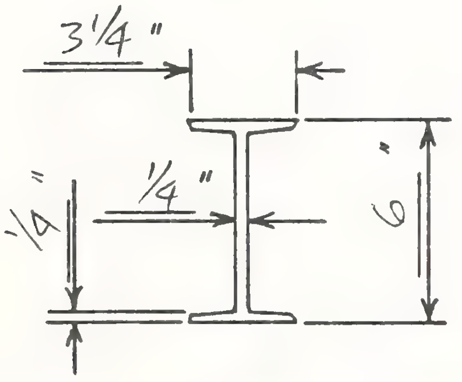
Inspector K.Q.

Date 7-19-79

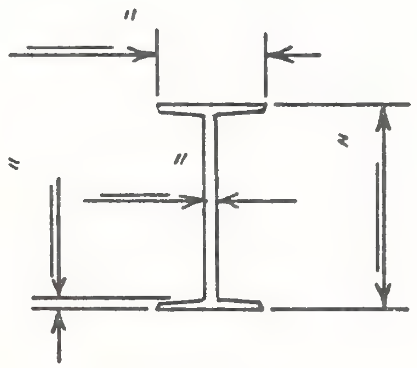


11 Stringers (total)

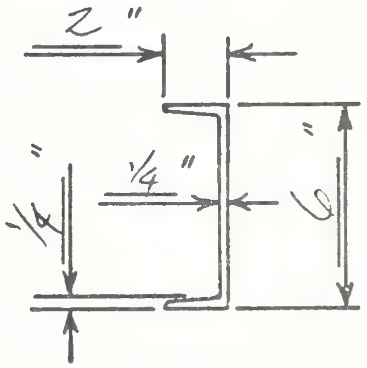
Span Length 56' 0"



STRINGER "A"



STRINGER "B"



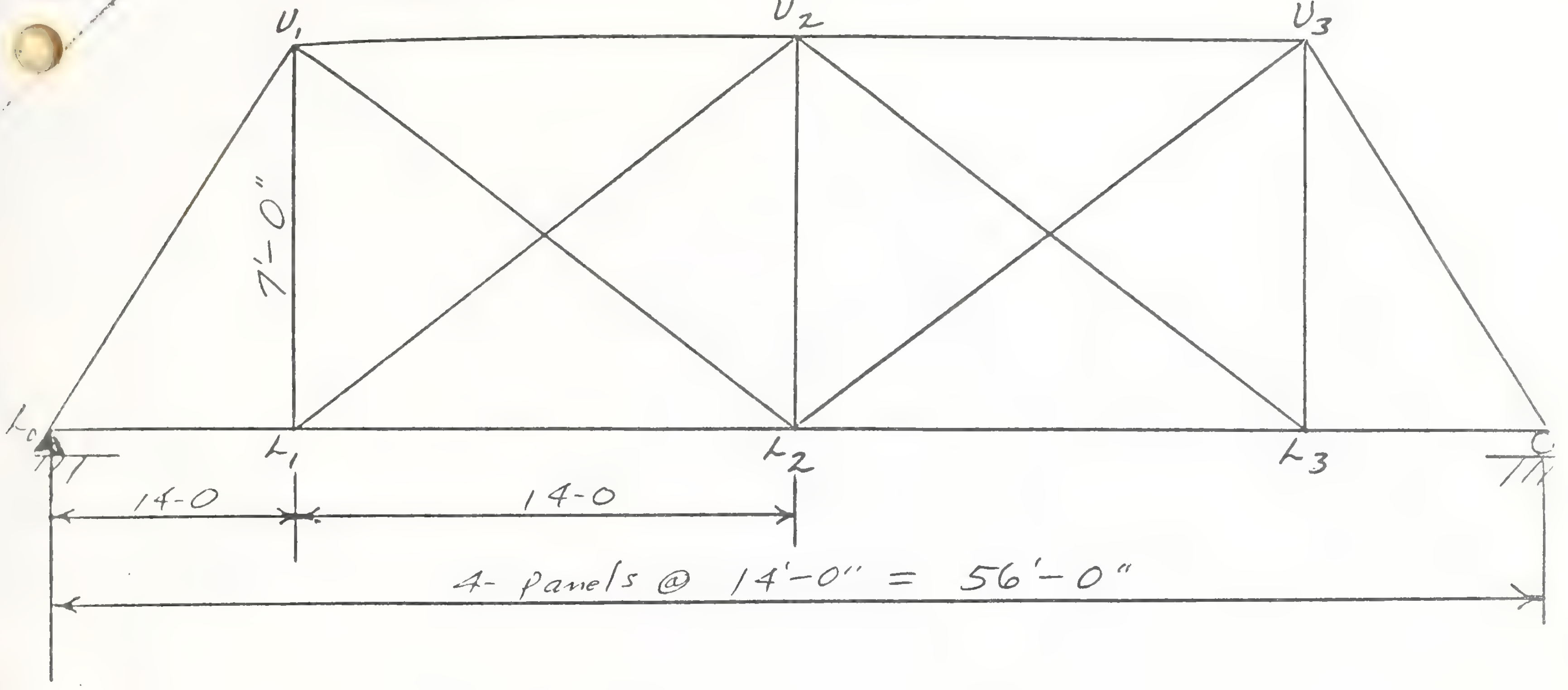
STRINGER "C"

Comments: stringers are in good Condition

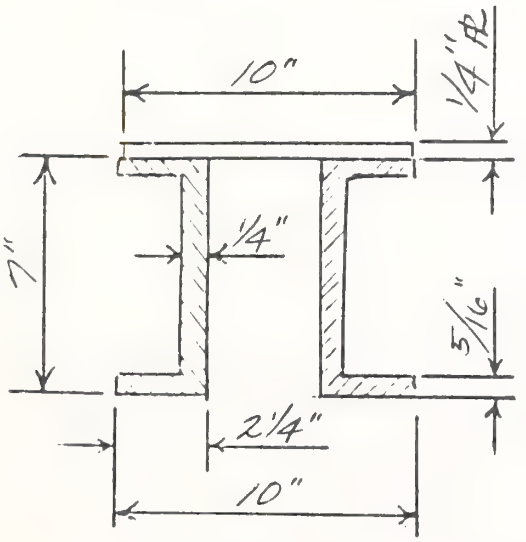
~~L42129-00010~~-930 (USRS Main Canal) Quale & Kaufmann 7-19-7

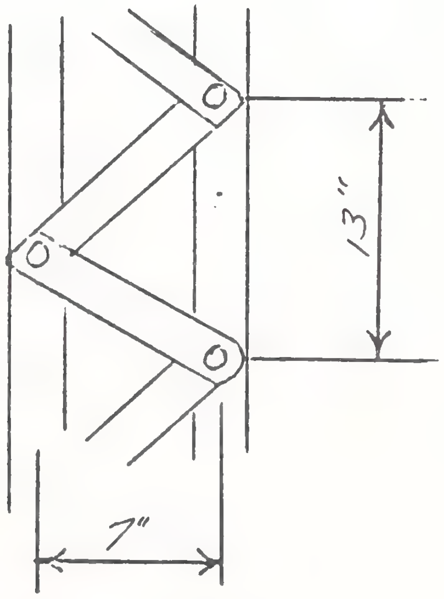
, sdr. Measurements: sheet 1 of

L42339-0.9



From center of upstream truss to center of downstream truss = 18'-9"





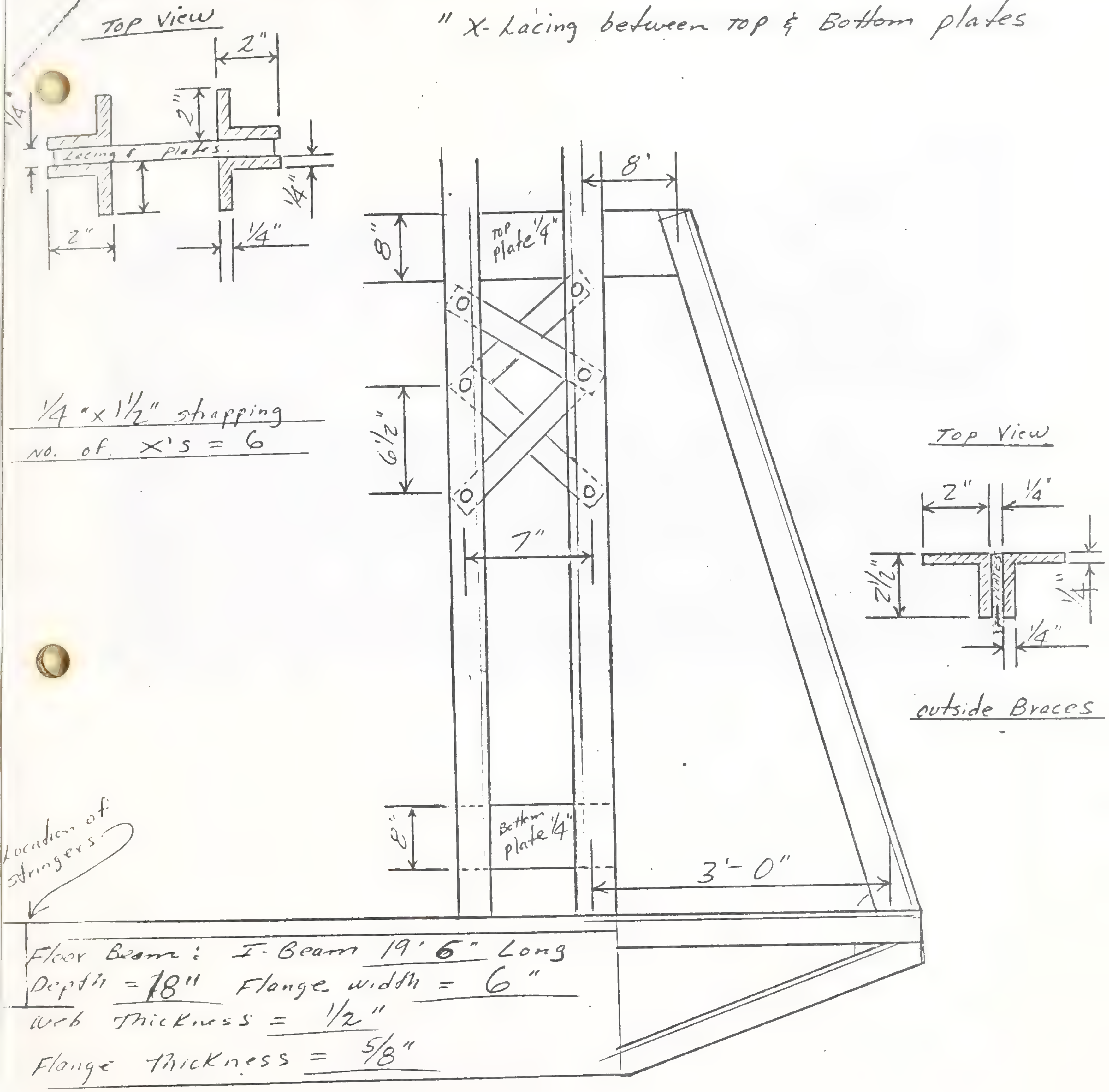
(L_0U_1; U_1U_2; U_2U_3; U_3L_4): End posts & upper chord. ~ 1/4" x 1 3/4" strapping (Bottom side)

Lower chord —— 2-eye bars 3/4" x 2 1/2"

Diagonals ~ (U_1L_2; L_2U_3): 2-eye bars 1/2" x 2".

(L_1U_2; U_2L_3): one 1" square Rod.

" X-Lacing between Top & Bottom plates

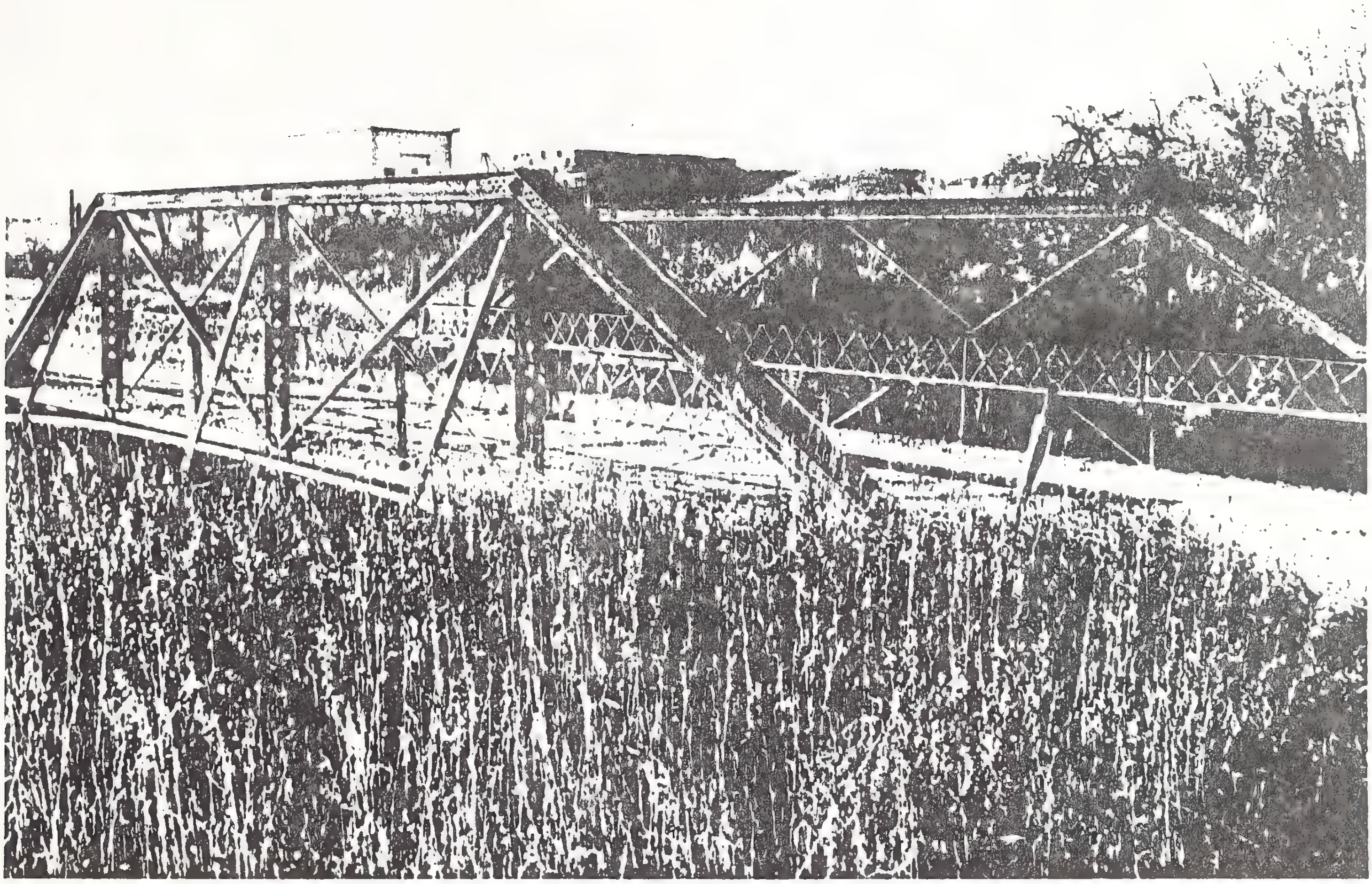


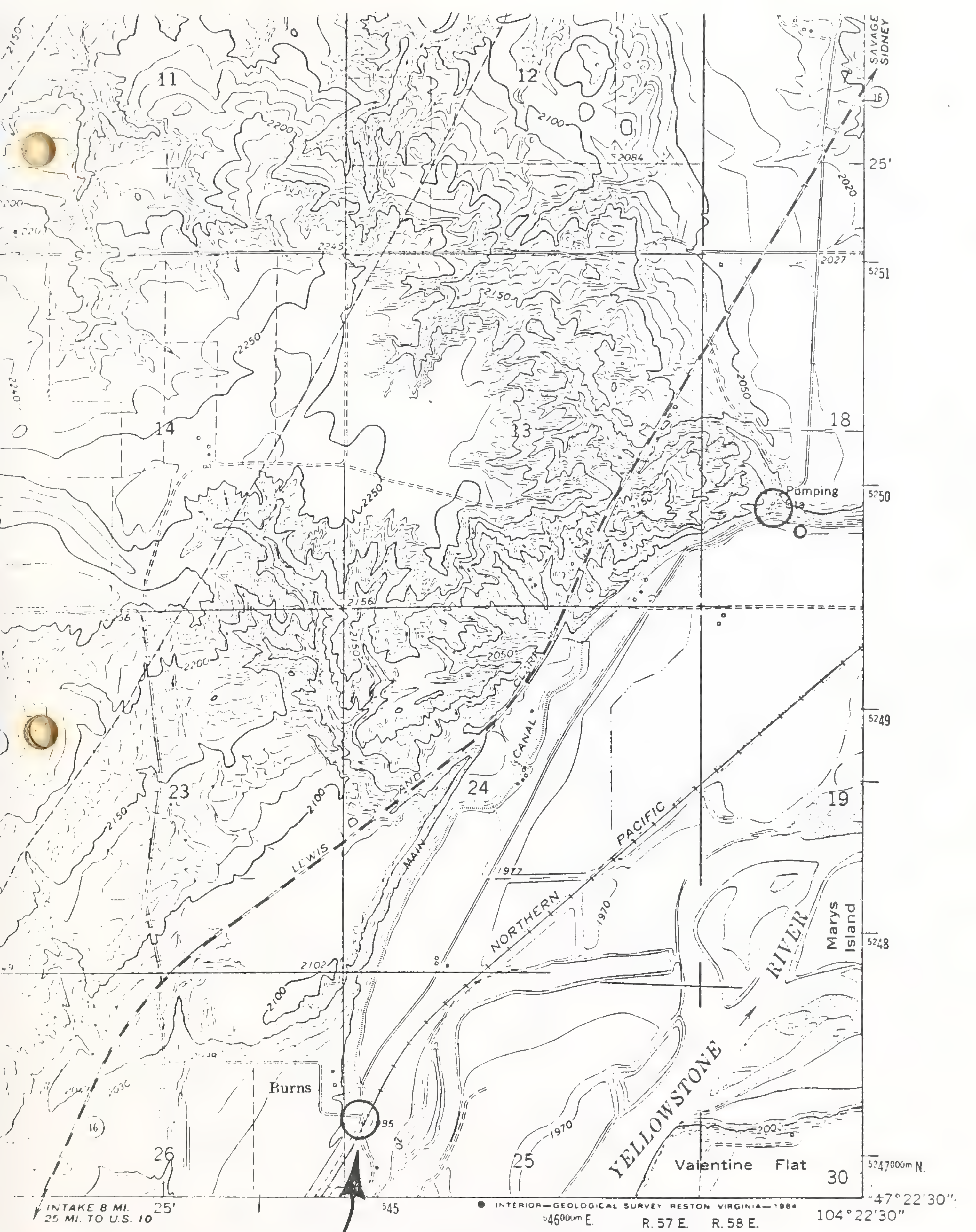
1/4" x 1 1/2" strapping

No. of X's = 6

Floor Beam: I-Beam 19' 6" Long
Depth = 18" Flange width = 6"
Web Thickness = 1/2"
Flange Thickness = 5/8"

Vertical Members & outside Bracing
(U_1L_1; U_2L_2; U_3L_3).





334-0.9

78-C Zone 13 544900E 5247130N

Kn[illegible] River Mine, Mont 1:24000 Contour 10'

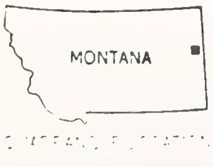
SW[illegible]W¼NW¼ Sec. 25, T. 19 N., R. 57 E.

ROAD CLASSIFICATION

highway, all weather, Light-duty road, all weather, improved surface

Unimproved road, fair or dry weather

State Route



KNIFE RIVER MINE, MONT.

Map 4

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL* 165 Site Name: *Pettigrove's, USRS Canal Bridge*
Structure Number: *L42 334 003+0.100-1 077-C* Year Built: *1907*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *SE¼NW¼SW¼, Sec. 18 T. 19 N., R. 58 E.*
UTM Zone: *13, 546705 E. 5249875 N.*
Quad Name: *Knife River Mine, Mont.* Scale: *1:24,000*
County/City: *Richland* Route *334* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City _X_ Federal __ Private __ Tribal __
Specify Richland

PRESENT USE:

BASIC BRIDGE (check as appropriate)

- __ Beam, Slab, Girder
- __ Suspension
- __ Arch
- __ Movable
- _X_ Truss
  - _X_ Pin connected
  - __ Rigid

MATERIALS

- __ Wood
- _X_ Metal
- __ Combination
- __ Stone
- __ Reinforced Concrete
- __ Prestressed Concrete

TYPE

- __ Deck
- __ Pony
- _X_ Through (Laminated Wood and Gravel Deck)
- __ Combination

TRUSS DESIGN

- __ King Post
- __ Queen Post
- __ Howe
- _X_ Pratt
  - __ Double Intersection
  - __ Half Hip
  - __ Parker
  - __ Camelback
  - __ Pennsylvania (Petit)
    - __ Sub Struts
    - __ Sub Ties
  - __ Baltimore
- __ Lenticular
- __ Warren
  - __ Verticles
  - __ Polygonal Chord
  - __ Double Intersecting
  - __ Quadrangular
  - __ K
- __ Other

Length *80'* Width *17.3'* No. spans *1* No. panels *5*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, MN*

PHOTOGRAPHIC RECORD

Roll 2, Frames 19 and 20

NARRATIVE DESCRIPTION

Plans for this and one other bridge are found under Specifications 136, Drawings 4 and 5 of 6. This 80' pin-connected Pratt Through truss is 17.4' wide, 16' high, with vertical clearance of 11'. It is situated on a 40° skew. The lower chord is eyebars connected with 3" pins on which are hung the U bolts that support the floor beam-stringer system. The upper chord is a steel plate riveted to two channel sections, the bottom flanges of which are riveted together with lacing bars. The verticals are composed of 4 angle sections riveted together with lacing bars. Diagonal members are eyebars and eyebars with turnbuckles. The portal bracing is of two angle sections riveted in place with gussett plates. On the center of the portal is a plate upon which in raised letters is "1907 U.S.R.S." The portal and two inside struts are two angle sections, while top lateral bracing is eyebars. The guardrail is of 2 angle sections connected with lattice bars. It measured 18" in height.

NARRATIVE HISTORY

Contract 196 for this and two other bridges went to A.Y. Bayne and Company of Minneapolis, Minnesota. Baynes' bid for this one was $2,630.50. There were two 80' single spans built on a 40° skew at Stations 394 and 636, the latter of which is this site. This, the Pettigrove Bridge, was slightly cheaper to fabricate, costing $2,212.06, but more expensive in terms of labor at $310.75. With $50 set aside for painting, the total cost was $2,572.81. Bayne did not bill for the $67.79 balance, allowing the job to be paid at less than contract price. The U.S. Reclamation Service spent $325 hauling the steel and lumber to the site, and $150.42 on engineering. The total cost to the Lower Yellowstone Project was $3,003.23.

INTEGRITY *Good. In 1986 the bridge rated 62.1 sufficiency.*

Altered Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

This is one of two 80', 40° skew, Pratt Through Truss bridges built on the canal, the most sophisticated truss type design on the Lower Yellowstone Project. Of the two, this one is in slightly better condition.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 19, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Soil disturbance from canal and road construction was substantial.*

Was historical/architectural survey conducted around the structure?

Yes X No __

Results negative X

Comments:

EV:cm:3/w

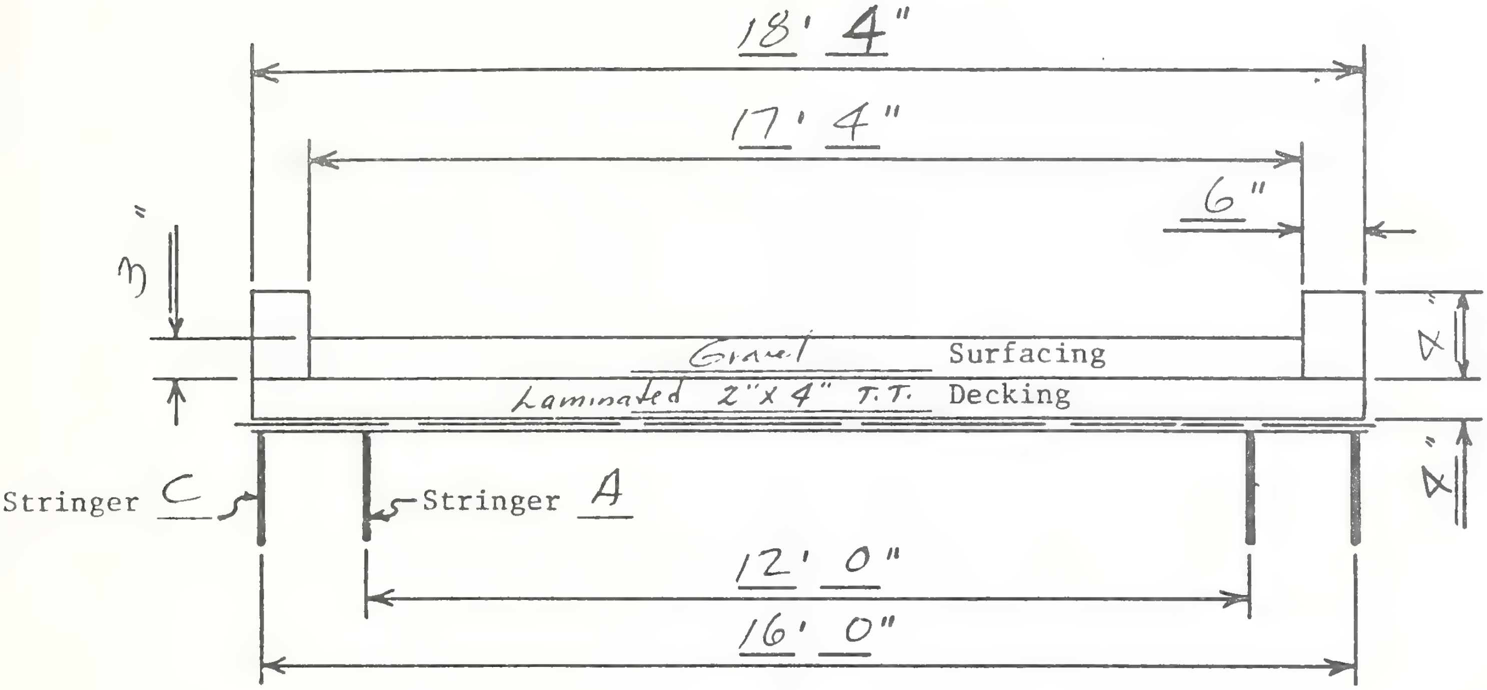
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number 33a L42~~1E9~~ 00310.140 Span(s) Truss

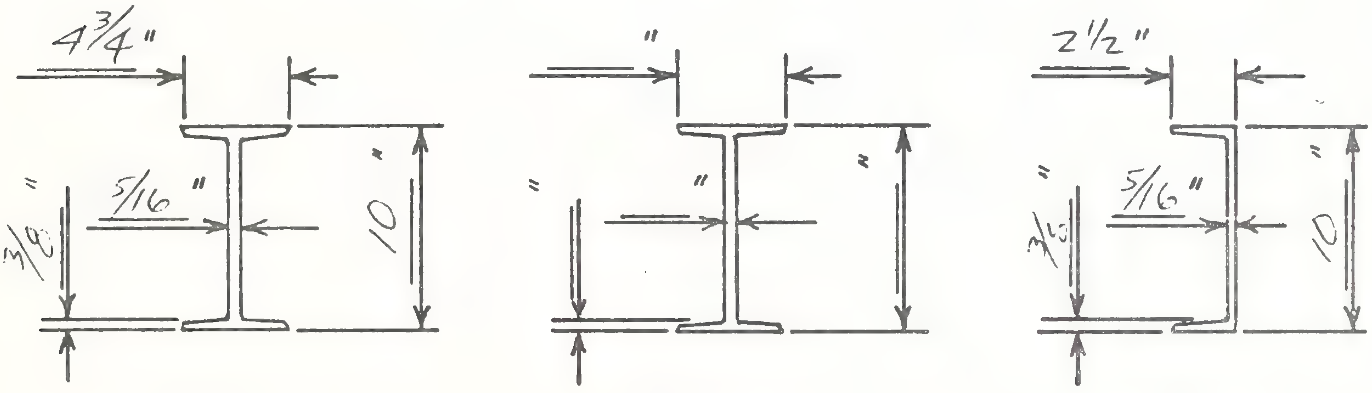
Inspector K.Q.

Date 7-19-79



11 Stringers (total)

Span Length 80' — "

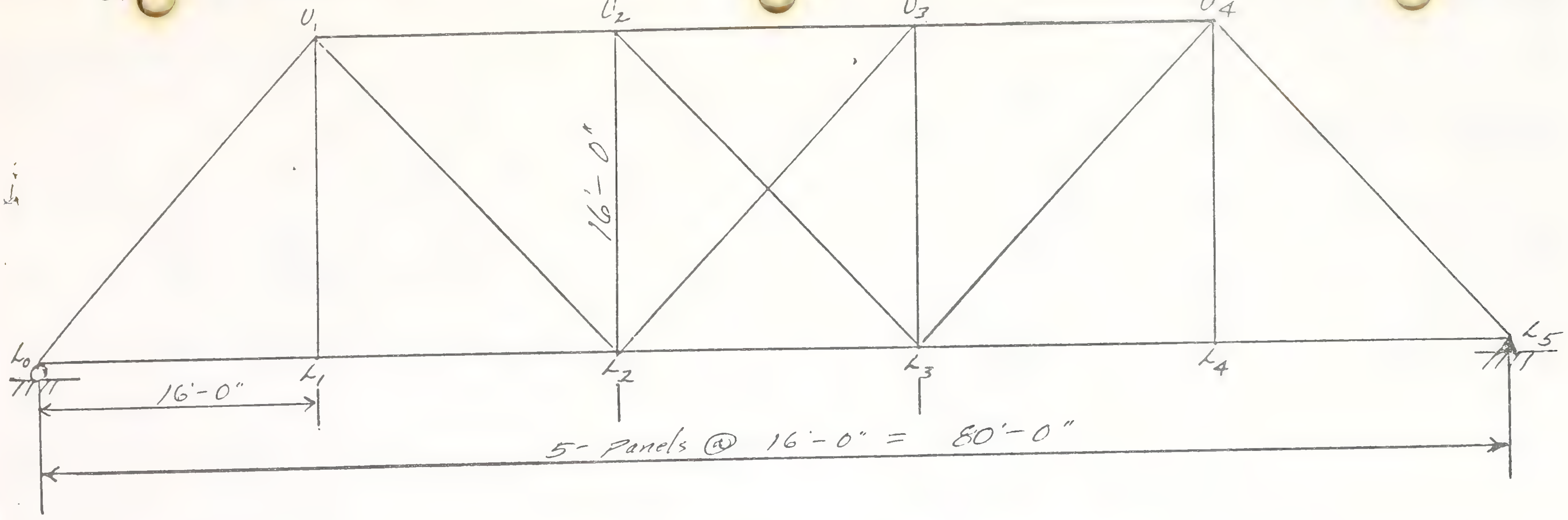


STRINGER "A" STRINGER "B" STRINGER "C"

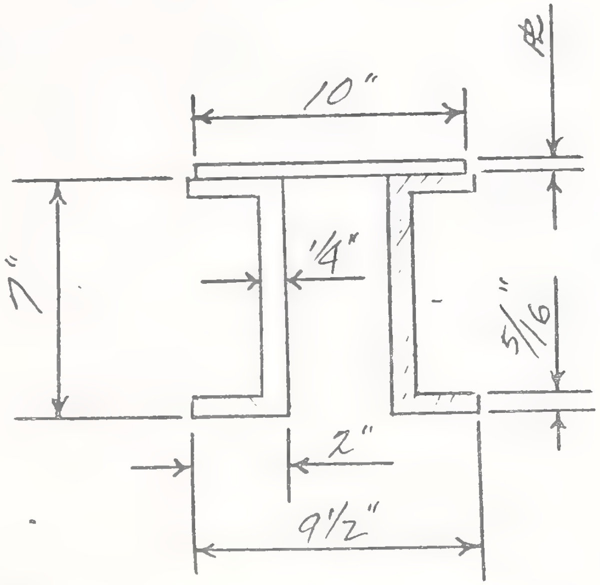
Comments: stringers are in good Condition.

Str Measurements:

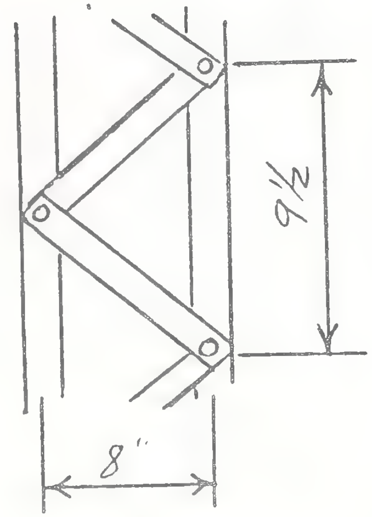
Sheet 1 of



From center of upstream truss to center of downstream truss = 19'-0"



Posts & Upper Chord ~
(" U2; U2 U3; U3 U4; U4 L5.)



1/4" x 1 1/2" Strapping
(Bottom side)

Lower Chord ~~& Diagonal Bracing~~

L0 L1 : 2- eye bars 3/4" x 2 3/4

Vertical & Diagonal Bracing

U1 L1 : 2-eye bars 5/8" x 2

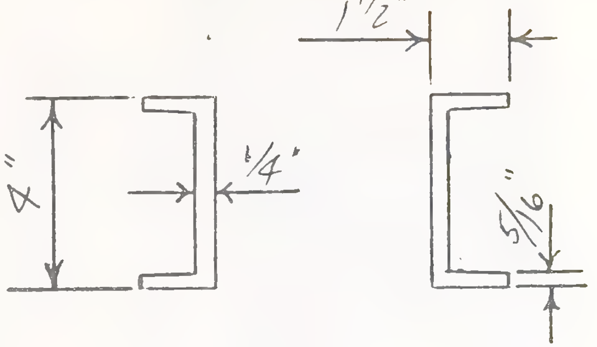
U1 L2 : 2-eye bars 3/8" x 2

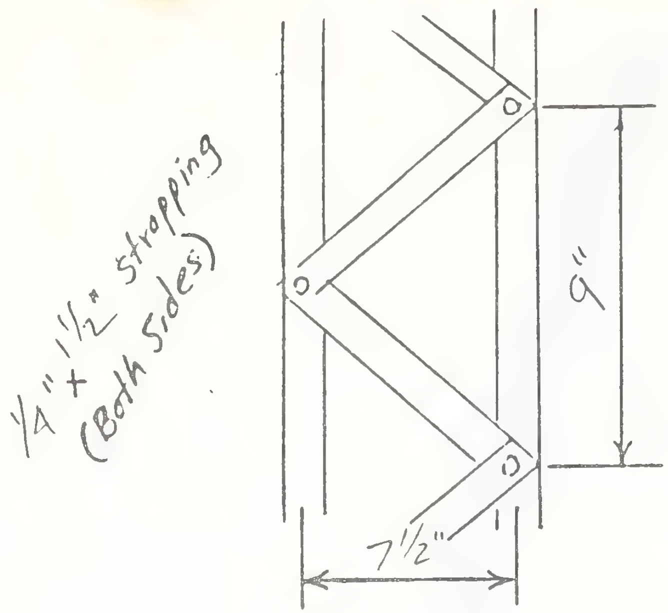
U2 L3 : 1- 1 1/4" (dia) Rod

U3 L2 : 1- eye bar 5/8" x 2"

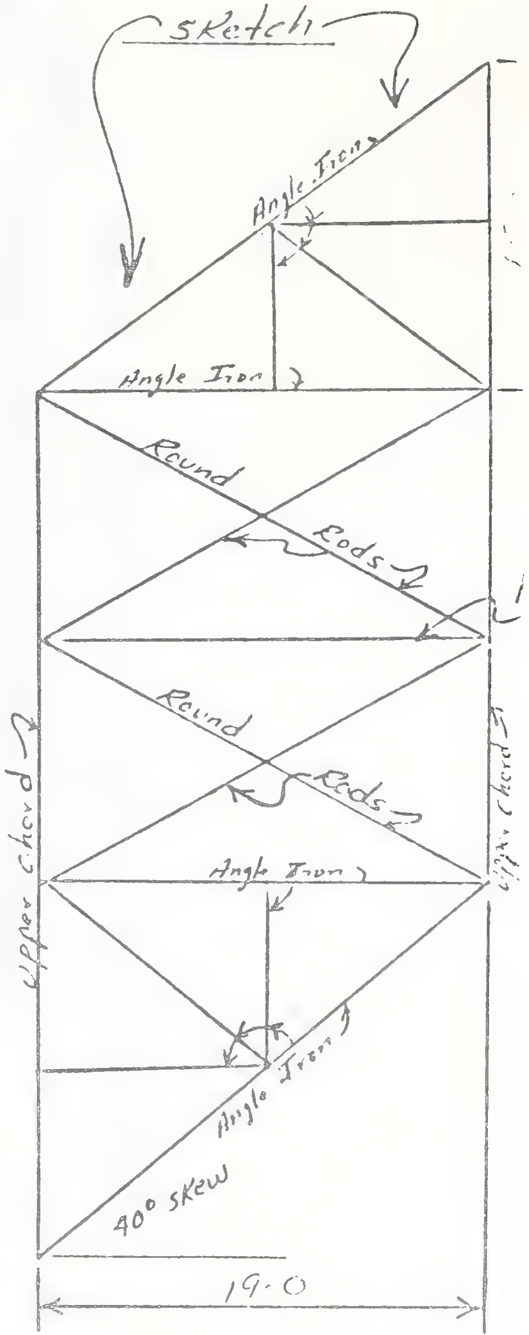
(other End the same)

Vertical Members
$(U_2L_2;\ U_3L_3)$:





TOP OF TRUSS BRACIN

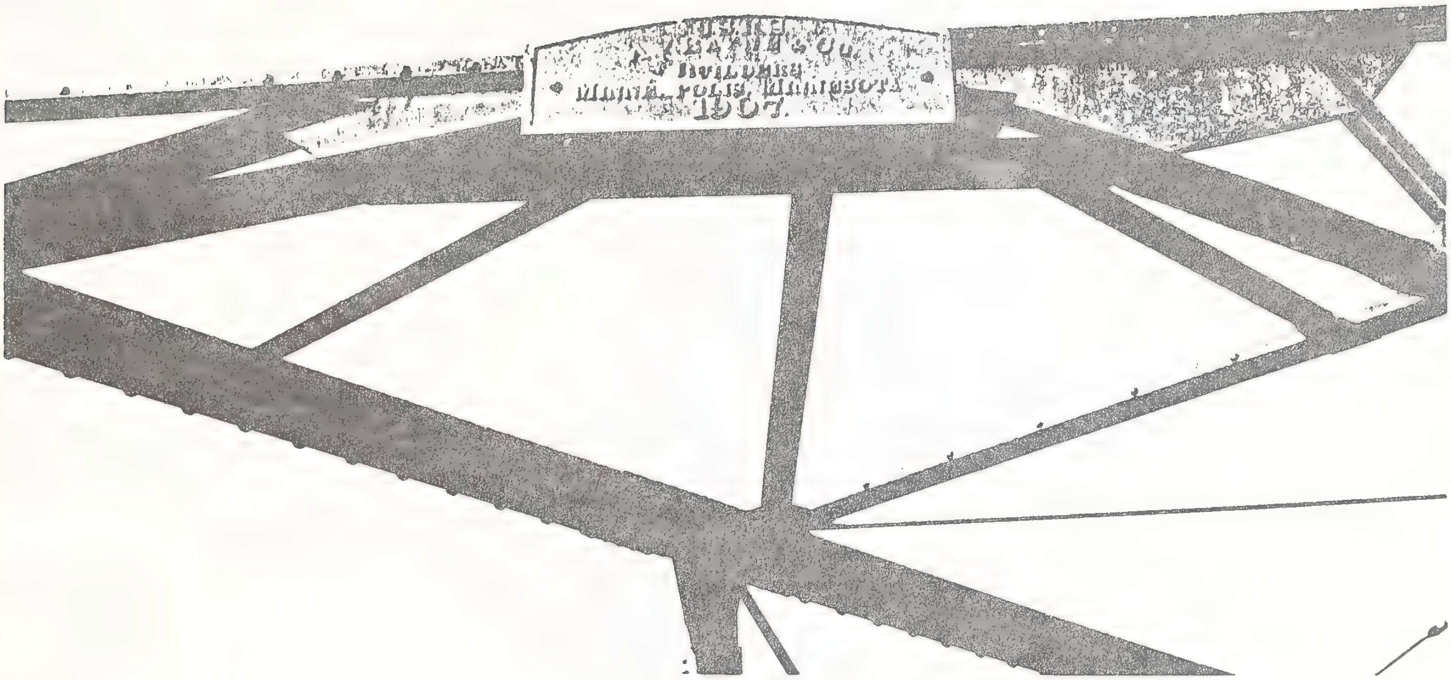


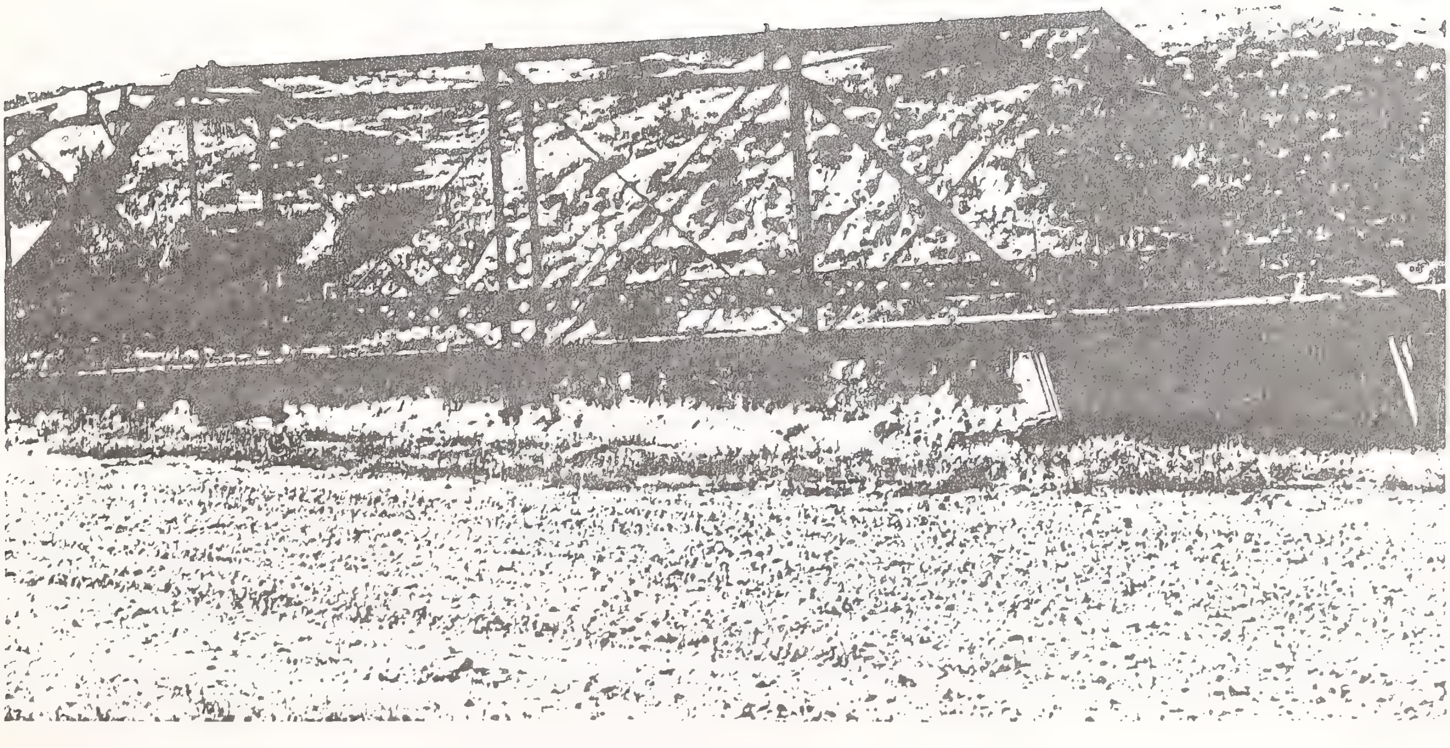
Floor beam : I beam 20' 0" Long, Depth = 20"

Flange width = 6 1/4"

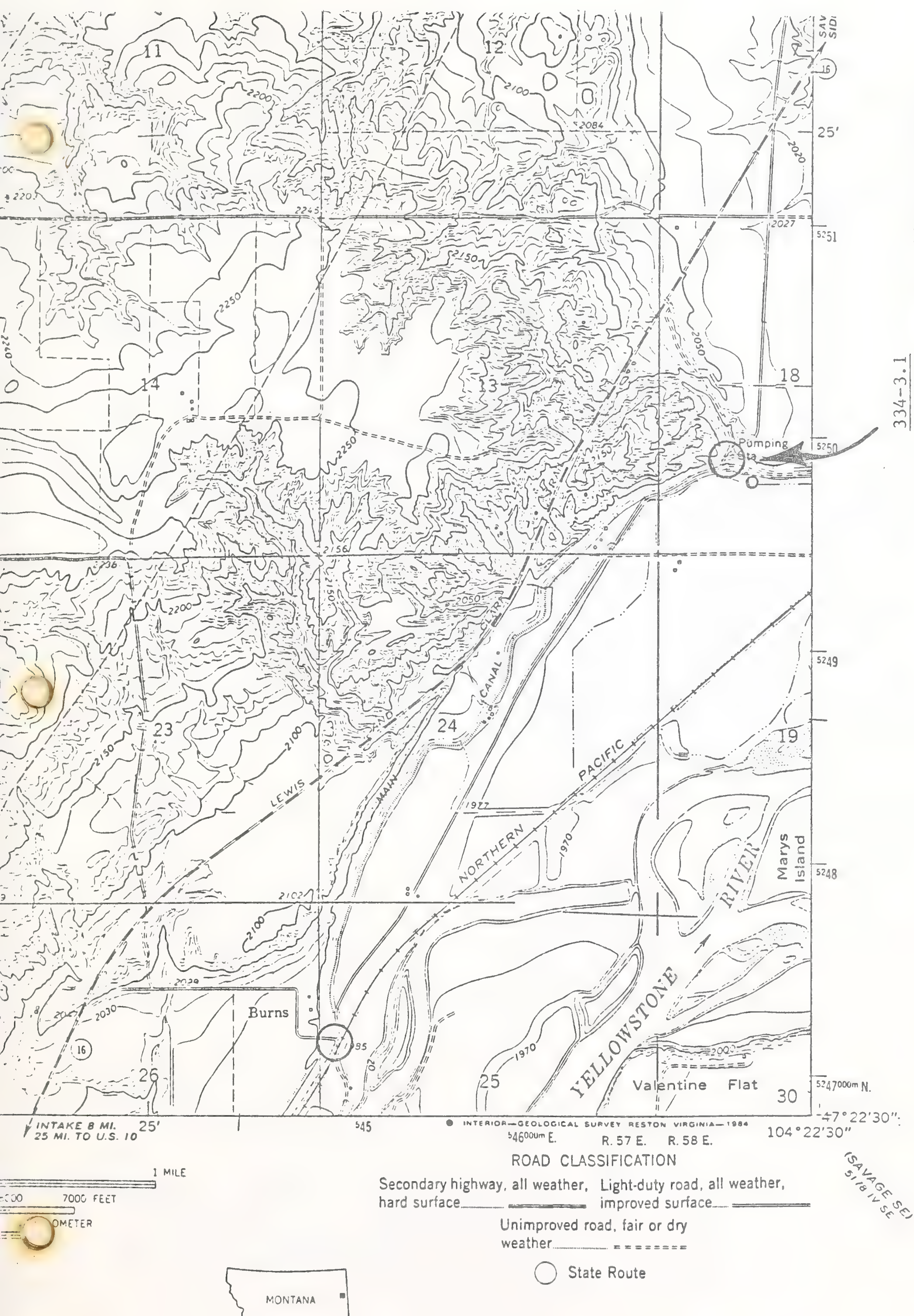
web thickness = 1/2"

Avg Flange thickness = 3/4"


BUILDERS
MINNEAPOLIS, MINNESOTA
1907



334-3.1
77-C Zone 13 546705E 5249875N
Knife River Mine, Mont 1:24000 Contour
SE¼NW¼SW¼ Sec. 18, T. 19 N., R. 58 E.



KNIFE RIVER MINE, MONT.

Map 4

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL166* Site Name: *Stockpiled USRS Canal Bridge*
Structure Number: Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *NW¼SE¼SW¼, Sec. 18 T. 19 N., R. 58 E.*
UTM Zone: *13, 546600 E. 5249775 N.*
Quad Name: *Knife River Mine* Scale: *1:24,000*
County/City: *Richland* Route Mile Crossing *None*

OWNERSHIP: MDOH ☐ County/City ☐ Federal ☒ Private ☐ Tribal ☐
Specify Bureau of Reclamation

PRESENT USE: *None. The bridge is resting on timbers on the south side of the road that follows the canal, apparently stockpiled until needed elsewhere.*

BASIC BRIDGE (check as appropriate)

- ☐ Beam, Slab, Girder
- ☐ Suspension
- ☐ Arch
- ☐ Movable
- ☒ Truss
    - ☒ Pin connected
    - ☐ Rigid

MATERIALS

- ☐ Wood
- ☒ Metal
- ☐ Combination
- ☐ Stone
- ☐ Reinforced Concrete
- ☐ Prestressed Concrete

TYPE

- ☐ Deck
- ☒ Pony
- ☐ Through
- ☐ Combination

TRUSS DESIGN

- ☐ King Post
- ☒ Queen Post
- ☐ Howe
- ☐ Pratt
    - ☐ Double Intersection
    - ☐ Half Hip
    - ☐ Parker
    - ☐ Camelback
    - ☐ Pennsylvania (Petit)
        - ☐ Sub Struts
        - ☐ Sub Ties
    - ☐ Baltimore
- ☐ Lenticular
- ☐ Warren
    - ☐ Verticles
    - ☐ Polygonal Chord
    - ☐ Double Intersecting
    - ☐ Quadrangular
- ☐ K
- ☐ Other

Length *38'* Width *18'* No. spans *1* No. panels *3*
Abutments *None* No. Piers *N/A* Type
Designer/Engineer *U.S. Reclamation Services, A. P. Davis, Chief Engineer*
Fabricator *Luckawana Steel*
Builder/Contractor *Minneapolis Steel and Machinery Company*

PHOTOGRAPHIC RECORD

Roll 5, Frames 13, 14

NARRATIVE DESCRIPTION

This Minneapolis Steel and Machinery Co. steel truss is a single span 38' in length, and 18' wide. The 3 panel Queen Post measures 12'8" each panel. The lower chord is forged steel eyebars connected with 2" pins. The inclined end posts and upper chord are of continuous steel plate riveted atop two channel sections that are closed on the bottom flanges by lacing bars. The verticals are two angle sections riveted together with lacing bars. Counters are eyebars or eyebars with turnbuckles. Knee braces of two angle sections are riveted to the I beam floor beam, and rise to the upper vertical where they are riveted in place with a gusset plate. The guardrail is two angle sections spaced 18" apart and riveted to lattice bars. The Minneapolis Steel and Machinery Co. name plate is still in place. There is no deck, so the floor beam-stringer system is clearly visible. There are 9 rows of I beam stringers with standard channel beams on the outside, all resting on I beam floor beams. This is the "heavy" or 15 ton model.

NARRATIVE HISTORY

This Queen Post probably was located just south of Third Hay Creek where it carried a county road to the west. Two others, both light trusses, were within a half mile to either side of this one, indicating a high use area, probably due to a greater concentration of population. None of the three in the vicinity remain in place, and only the southern most one was replaced by a modern bridge (1985 Concrete Tee Beam). This probably reflects a diminished need for crossing in this vicinity.

INTEGRITY *Probably Good.*

Altered Unaltered Moved X Date
Summary of Move:

SIGNIFICANCE

The bridge is historically significant as one of the original USRS Canal Bridges, and this one is one of two Minneapolis Steel and Machinery Co. heavy truss Queen Posts. One other is at 7th Street Fairview, and also was moved from its original location. Moved bridges are ineligible for listing on the National Register.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 27, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes _X_ No __

Results negative _X_

Comments: *Area was disturbed by canal and road construction.*

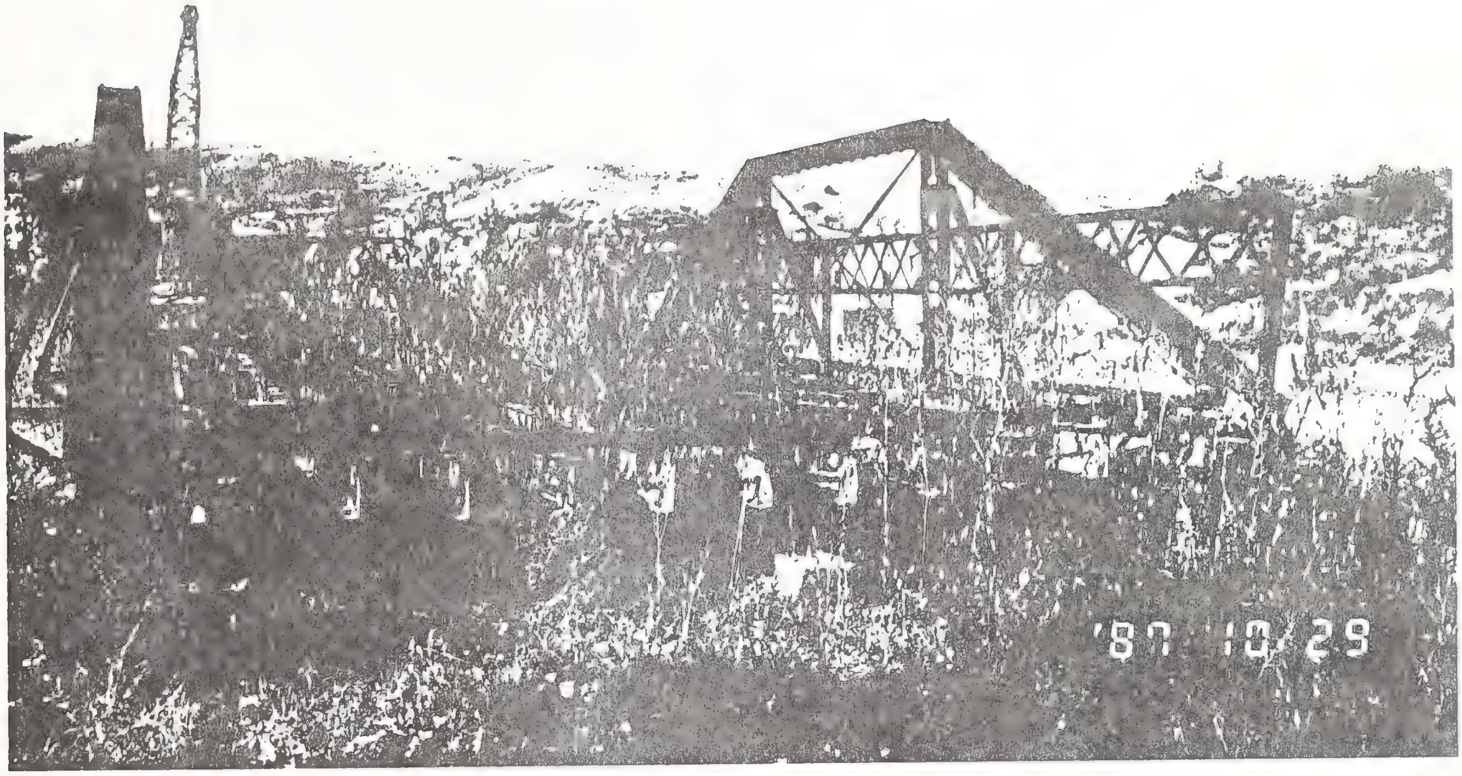
Was historical/architectural survey conducted around the structure?

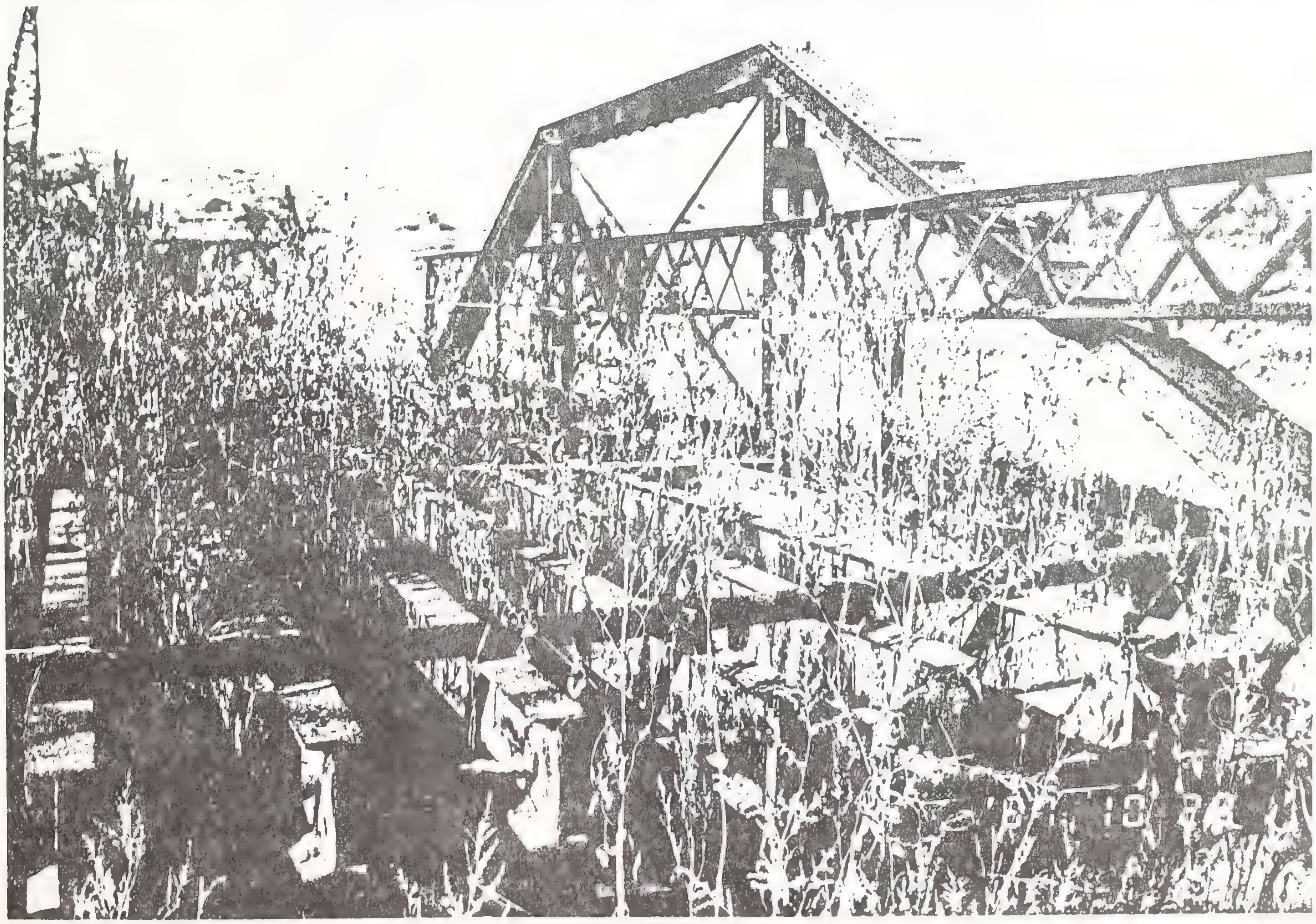
Yes _X_ No __

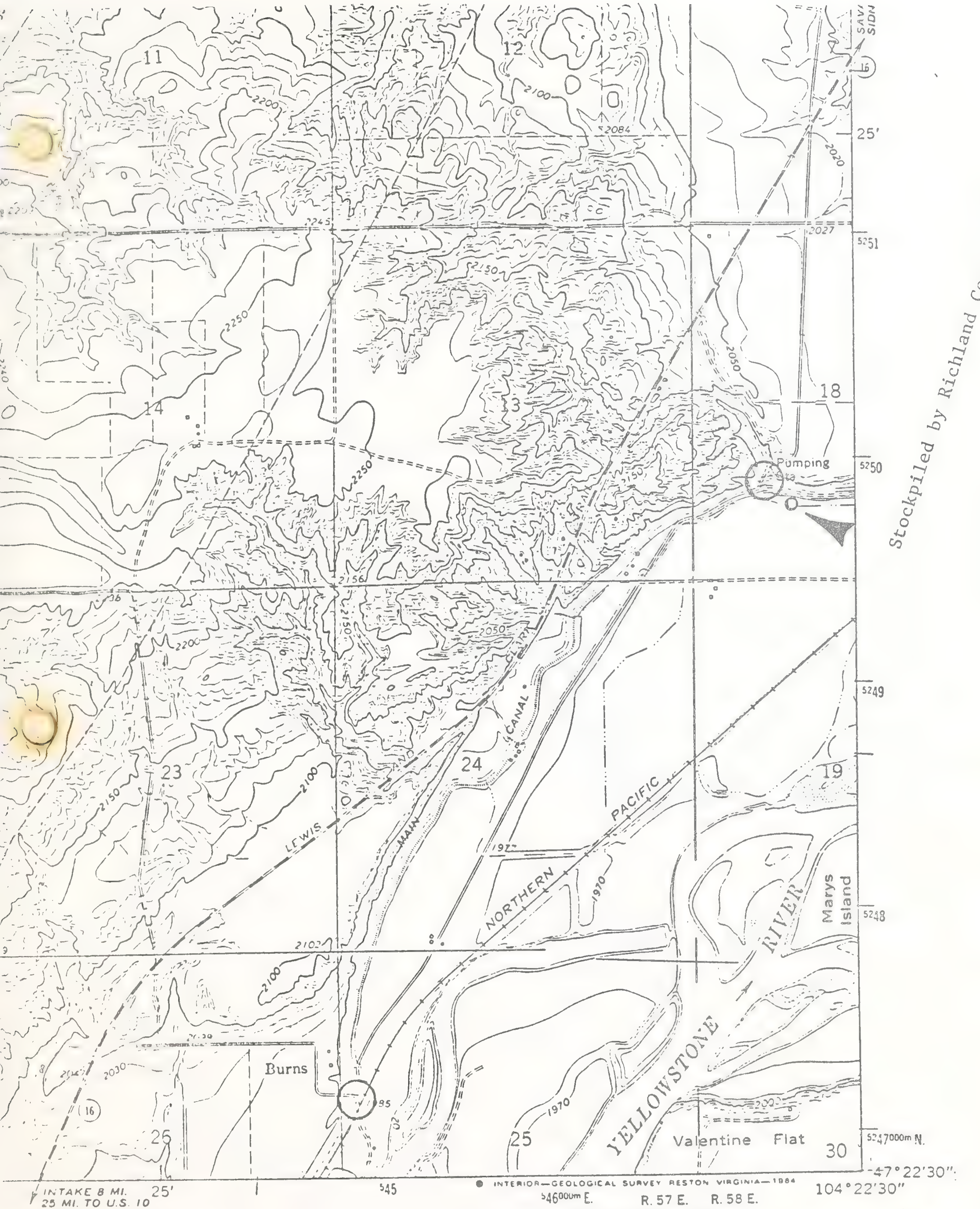
Results negative _X_

Comments: *No historic structures nearby.*

EV:1:mb:255/c


'87 10 29


10 29



Stockpiled by Richland County

ROAD CLASSIFICATION

Secondary highway, all weather, hard surface	Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather	

State Route

QUADRANGLE LOCATION

Map 4

KNIFE RIVER MINE, MONT.

MONTANA BRIDGE INVENTORY FORM

Site Number: 24RL 167 Site Name: USRS Canal Bridge, 3 Mi. S. of Savage
Structure Number: L42 332 000+0.300-1 052-C Year Built: 1908
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: NW¼SE¼NE¼, Sec. 7 T. 19 N., R. 58 E.
UTM Zone: 13, 547720 E. 5252130 N.
Quad Name: Savage, Mont. Scale: 1:24,000
County/City: Richland Route 332 Mile Crossing Main Canal

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Richland County

PRESENT USE: USRS Canal Bridge, Lower Yellowstone Irrigation Project

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
    X Pin connected
    __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
X Pony
__ Through
__ Combination

TRUSS DESIGN

__ King Post
__ Queen Post
__ Howe
X Pratt
    __ Double Intersection
    __ Half Hip
    __ Parker
    __ Camelback
    __ Pennsylvania (Petit)
        __ Sub Struts
        __ Sub Ties
    __ Baltimore
__ Lenticular
__ Warren
    __ Verticles
    __ Polygonal Chord
    __ Double Intersecting
    __ Quadrangular
__ K
__ Other

Length 56' Width 17.5' No. spans 1 No. panels 4
Abutments concrete No. Piers 0 Type
Designer/Engineer U.S. Reclamation Service, A.P. Davis, Chief Engineer
Fabricator Lackawana Steel
Builder/Contractor Minneapolis Steel and Machinery Co., Minneapolis, MN

PHOTOGRAPHIC RECORD

Roll 2, Frame 18

NARRATIVE DESCRIPTION

Plans for this bridge are from Specifications 136, Drawing 3 of 6. This single span 56' pin-connected Pratt Pony truss has 4 panels measuring 14' each. It is 17½' wide and 8½' tall. The lower chord is forged steel eyebars connected by 2¼" pins to the vertical members of two angle sections riveted together with lacing bars. The top chord is a continuous steel plate riveted to two channel sections with lacing bars connecting the bottom flanges. Diagonals are two eyebars or eyebars with turnbuckles. Knee braces are riveted at the I beam floor beam and to an 8¼" plate on the verticals. The floor beam-stringer system is comprised of eleven 10" steel stringers. A lattice guardrail stands 3½' from the deck.

NARRATIVE HISTORY

The Minneapolis Steel and Machinery Company of Minneapolis, Minnesota got contract 218 to construct the heavy truss bridges for $17,885. They were not the low bidder, which was $1,171 less, but the design was not entirely satisfactory. There were nine bids ranging from $16,741 to $45,185. Schedule 1 of the bid request called for two steel stringers and eleven steel trusses, while another part of the historic record shows fourteen trusses. The construction map shows twelve locations where they were to have been placed. This one, at Station 750, was to be the second; the first was scheduled for Station 460. There is no bridge at 460 now, and it has not been determined whether it ever had one. Drawing 3 of 6, Specifications 136, show a 60' four-panel bridge planned for both here and 460. (This one is four feet shorter.) Another was to have been 56', and located at Station 970. It is not there either.

It is interesting to note that all of the Minneapolis Steel and Machinery Company's verticals are two angle sections with lacing bars, rather than four with lattice, as the plans show. Even without the name plate, one can easily distinguish the Minneapolis Steel from the A.Y. Bayne bridges built under Contracts 196 and 219.

INTEGRITY *Excellent. The structure is also in good condition, rating 78.4 in 1986.*

Altered Unaltered *X* Moved *No* Date
Summary of Move:

SIGNIFICANCE

This bridge is significant as the first example of the Minneapolis Steel and Machinery Company bridge on the USRS Canal.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson*
Montana Department of Highways
Date: *January 20, 1988*

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *The surface is disturbed from canal and road construction.*

Was historical/architectural survey conducted around the structure?

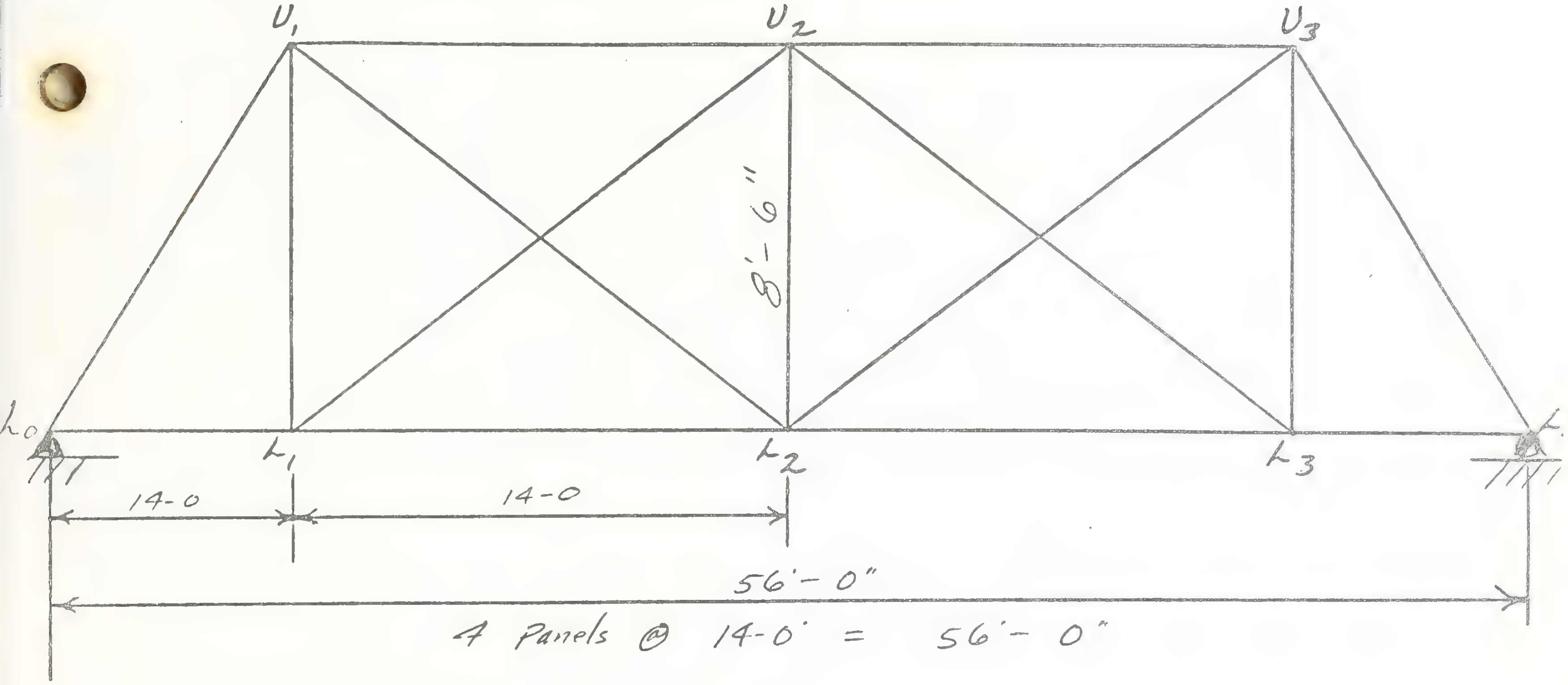
Yes X No __

Results negative X

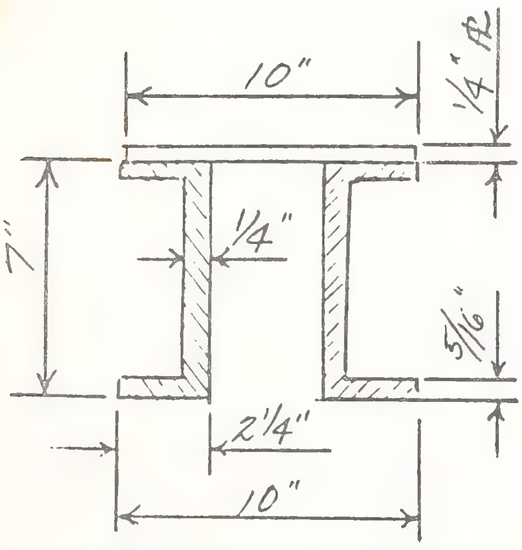
Comments: *Some farm buildings are about 1,000 feet away. These were not recorded.*

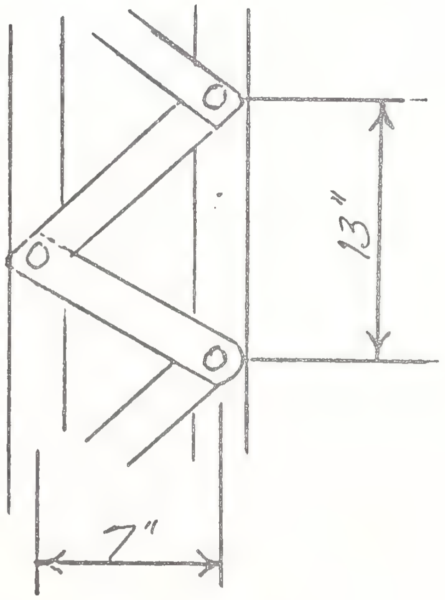
EV:cm:3/Q

Str. 332 Measurements: sheet 1 of 3



From center of upstream truss to center of downstream truss = 18'-9"





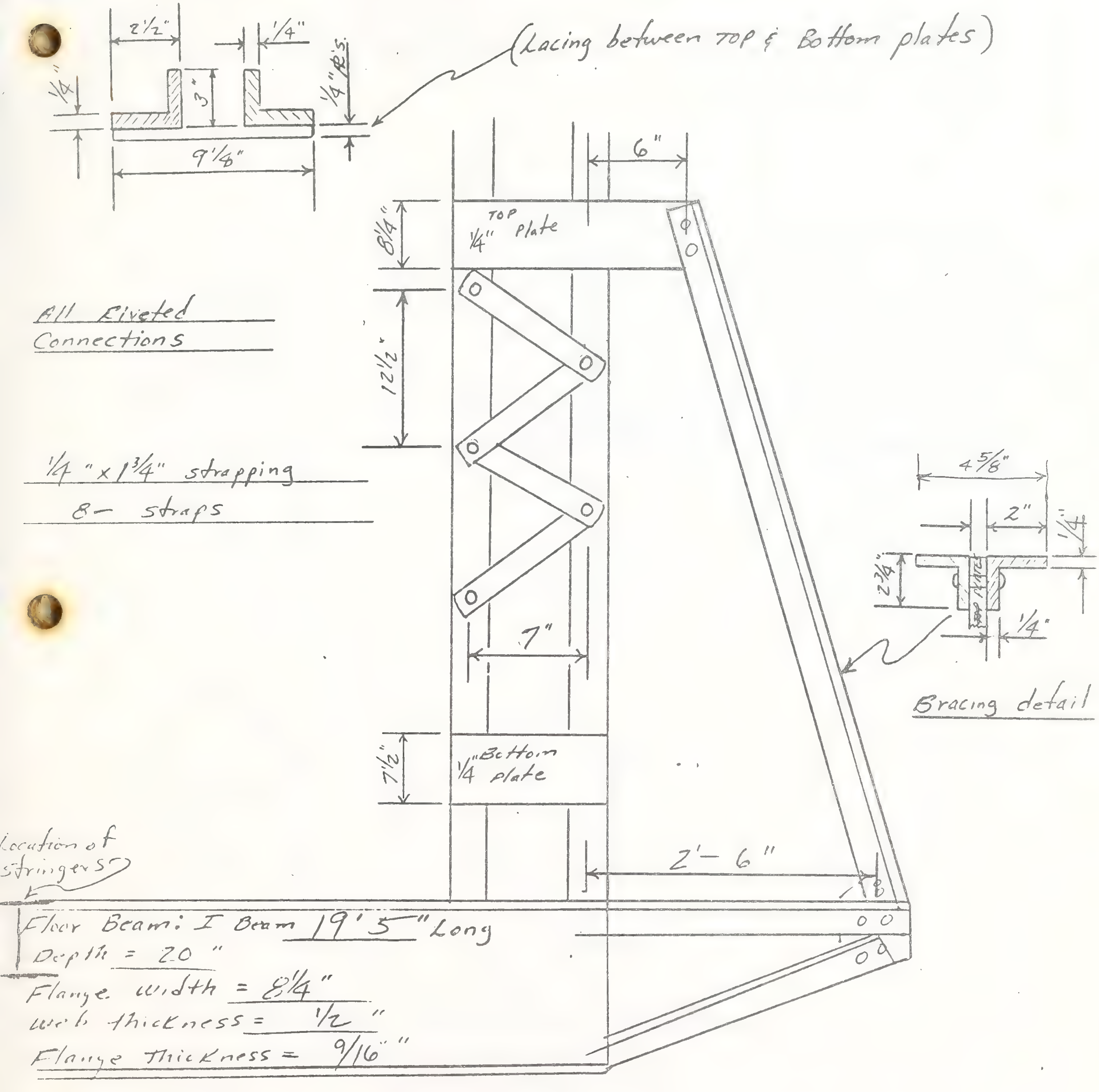
(L_0U_1; U_1U_2; U_2U_3; U_3L_4): 1/4 x 1 3/4" strapping
End posts & upper chord. ~ (Bottom side)

Lower chord ~ 2 eye bars 3/4" x 2 1/2".

Diagonal Bracing – (U_1L_2; L_2U_3): 2 eye bars 1/2" x 2".
(L_1U_2; U_2L_3) 1 – 1"(dia.) Rod.

42 ~~FE 7~~ 332 00010·300 (USRS Main Canal)

Sheet 2 of 3



All Riveted Connections

¼" x 1¾" strapping
8– straps

Floor Beam: I Beam 19' 5" Long
Depth = 20"
Flange width = 8¼"
web thickness = ½"
Flange Thickness = 9/16"

Vertical Members & outside Bracing.
(U₁ L₁; U₂ L₂; U₃ L₃):

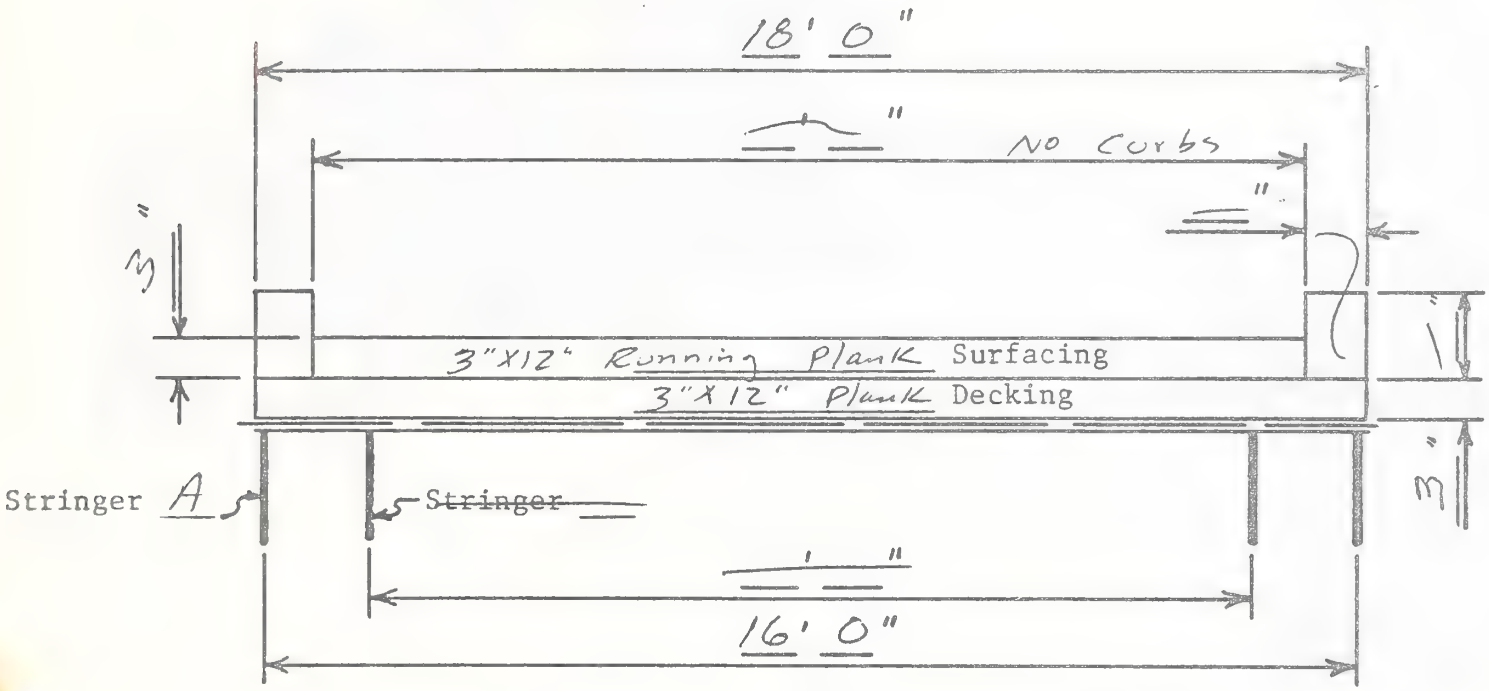
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number L42 332 00010.300 Span(s) Truss

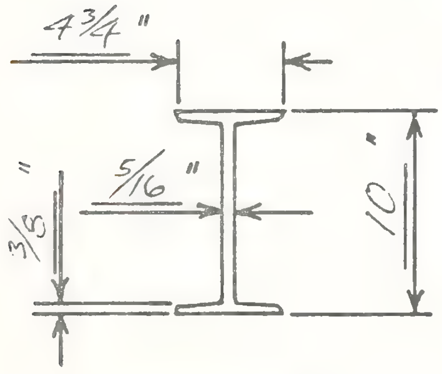
Inspector K.Q.

Date 7-9-79

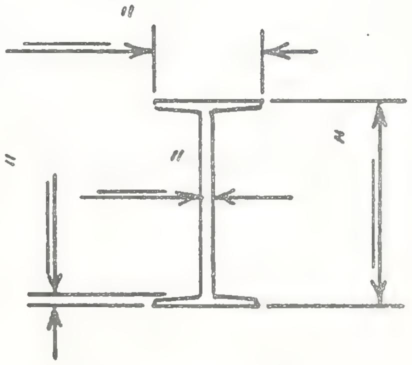


11 Stringers (total)

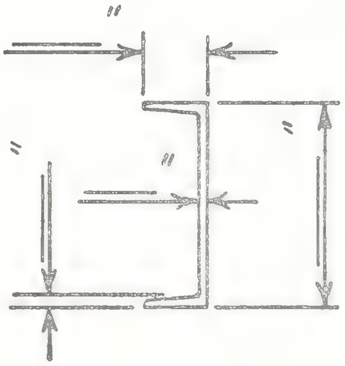
Span Length 56' 0"



STRINGER "A"

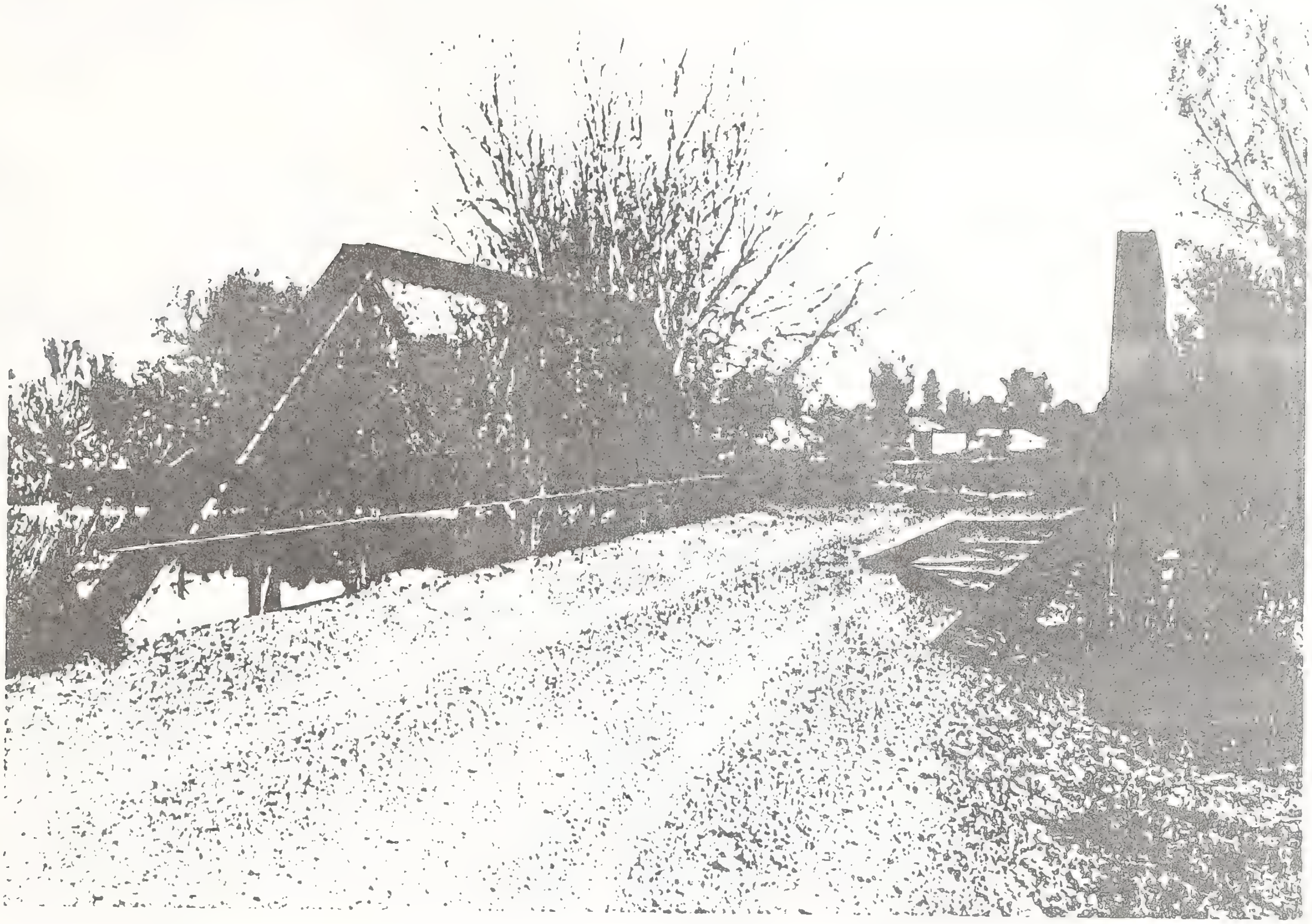


STRINGER "B"

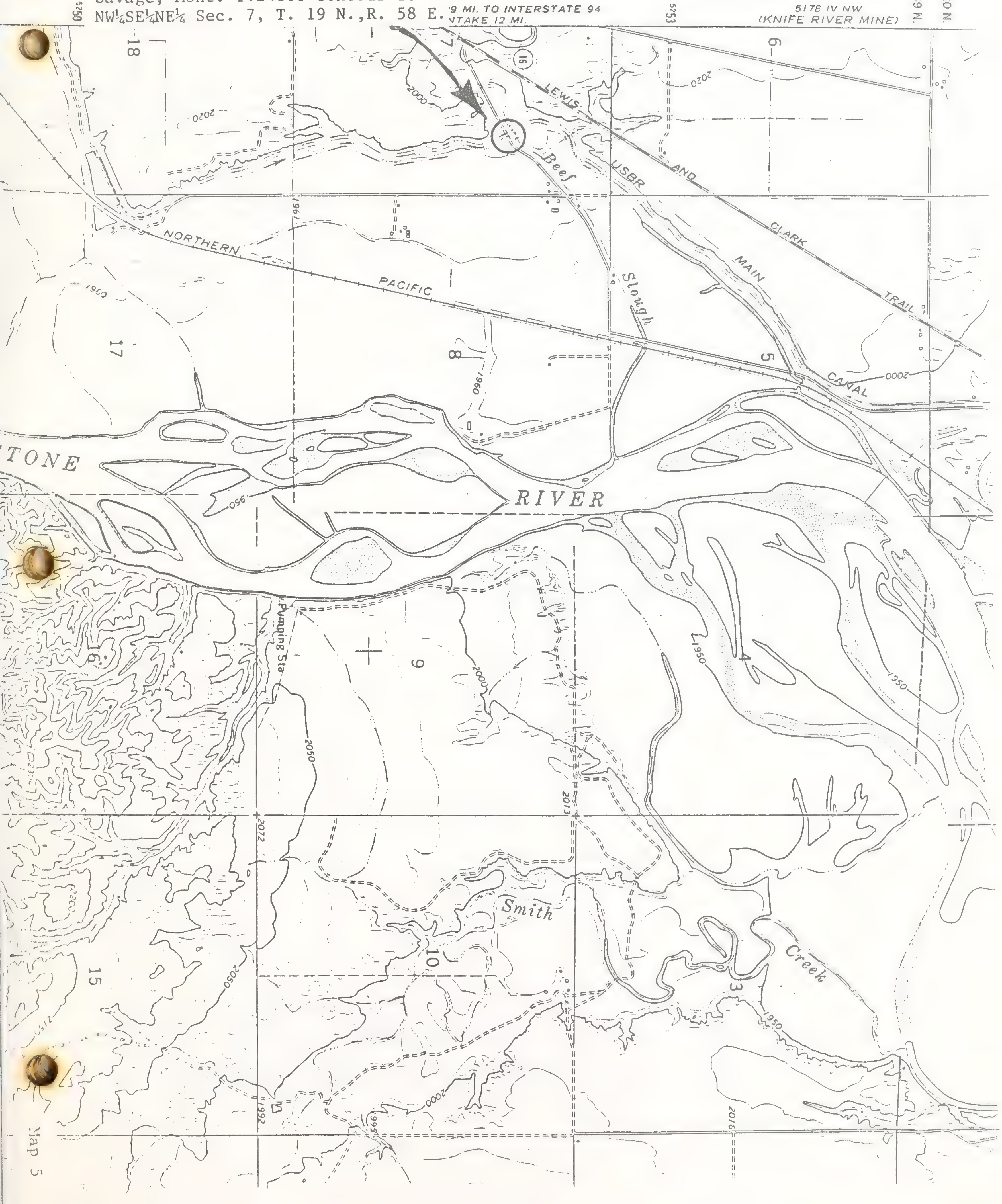


STRINGER "C"

Comments: stringers : Good Condition



332-0.3
52-C Zone 13 547720E 5252130N
Savage, Mont. 1:24000 Contour 10'
NW¼SE¼NE¼ Sec. 7, T. 19 N., R. 58 E.



Map 5

MONTANA BRIDGE INVENTORY FORM

Site Number: 24RL168 Site Name: USRS Canal Bridge, Crane
Structure Number: L42 502 025+0.200-1 008-C Year Built: 1908
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: SW¼NW¼SW¼, Sec. 15 T. 21 N., R. 58 E.
UTM Zone: 13, 555000 E. 5269185 N.
Quad Name: Crane, Montana Scale: 1:24,000
County/City: Richland Route 502 Mile Crossing Main Canal

OWNERSHIP: MDOH __ County/City _X_ Federal __ Private __ Tribal __
Specify Richland

PRESENT USE: USRS Canal Bridge, Lower Yellowstone Project

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
_X_ Truss
  _X_ Pin connected
  __ Rigid

MATERIALS

__ Wood
_X_ Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
_X_ Pony
__ Through
__ Combination

TRUSS DESIGN

__ King Post
__ Queen Post
__ Howe
_X_ Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
  __ K
__ Other

Length 54' Width 17.5 No. spans 1 No. panels 4
Abutments concrete No. Piers 0 Type
Designer/Engineer U.S. Reclamation Service, A. P. Davis, Chief Engineer
Fabricator Lackawana Steel
Builder/Contractor Minneapolis Steel and Machinery Co., Minneapolis, MN

PHOTOGRAPHIC RECORD

Roll 2, Frames 0, 1, 2

NARRATIVE DESCRIPTION

This 54' pin-connected Pratt Pony truss has 4 panels 14' each, is 17½' wide, and 8' high. It was constructed by Minneapolis Steel and Machinery Co. of Minneapolis, Minnesota as a part of Contract #218. The lower chord is forged steel eyebars connected with 2¼" pins. The inclined end post and top chord are of continuous steel plate riveted to 2 channel sections and closed with lacing bars on the bottom flanges. The vertical members are two angle section riveted together with lacing bars, and the diagonals are 2 eyebars or an eyebar with turnbuckles. Knee braces of 2 angle sections are riveted to the I-beam floor beam, and with a gussett plate to the upper verticals. The floor system is of 11 - 10" steel stringers covered with a plank deck. The lattice guardrail is partially missing. The bridge has apparently been moved about 20' north and set on new abutments. The old ones are visible up-channel.

NARRATIVE HISTORY

Minneapolis Steel and Machinery Company built this bridge in 1908 as a part of Contract 218 for heavy truss bridges. The town of Crane had not yet been established when the bridge was built, but Crane Creek was already named, probably after a local resident. This is the only one of three heavy truss bridges Minneapolis Steel built in Division 4. This one is at Station 1507. Station 1307 was to have had a 54' or 56' one, and a 51' Queen Post was removed from Station 1610 in 1982. Whether the Queen Post was original to that site, is unknown. The plans called for a 50' or 52' 4-panel bridge there. Nothing over 40' was scheduled as Queen Posts. Minneapolis Steel and Machinery Co. never followed plans carefully.

INTEGRITY *Diminished by partial loss of guardrail and bent steel members. The deck is deteriorated. Sufficiency rating was 63 in 1986.*

Altered Unaltered Moved *North 20'* Date *?*
Summary of Move: *The bridge was moved north about 20' to new abutments. This probably pre-dated the 1979 inspection.*

SIGNIFICANCE

The bridge is historically significant as a part of the Lower Yellowstone Project, but its integrity is compromised by a loss of a portion of the guardrail, a very distinctive feature of the Canal bridge.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 20, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes _X_ No __

Results negative _X_

Comments:

Was historical/architectural survey conducted around the structure?

Yes _X_ No __

Results negative _X_

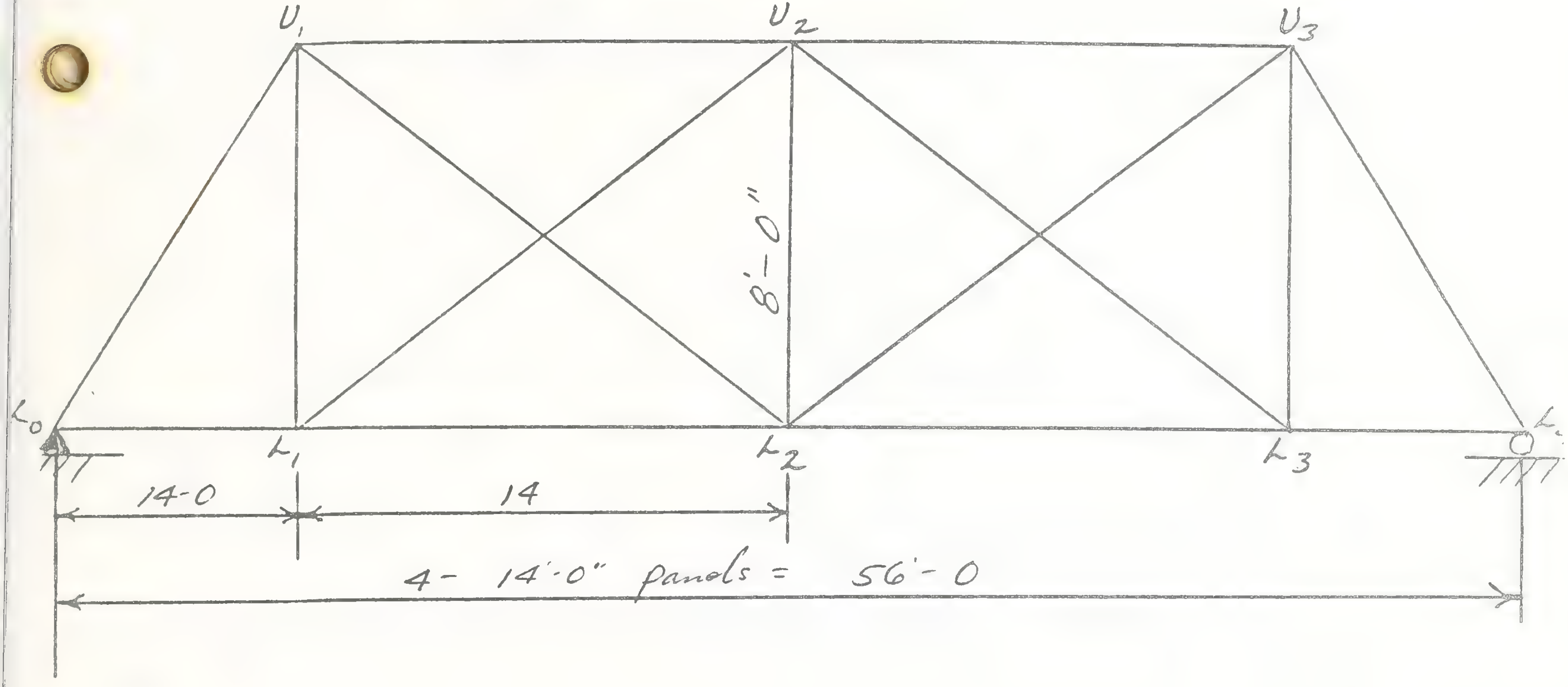
Comments: *The town of Crane is 1/2 mile east. It has some historic buildings, but does not have a potential historic district.*

EV:1:mb:255/f

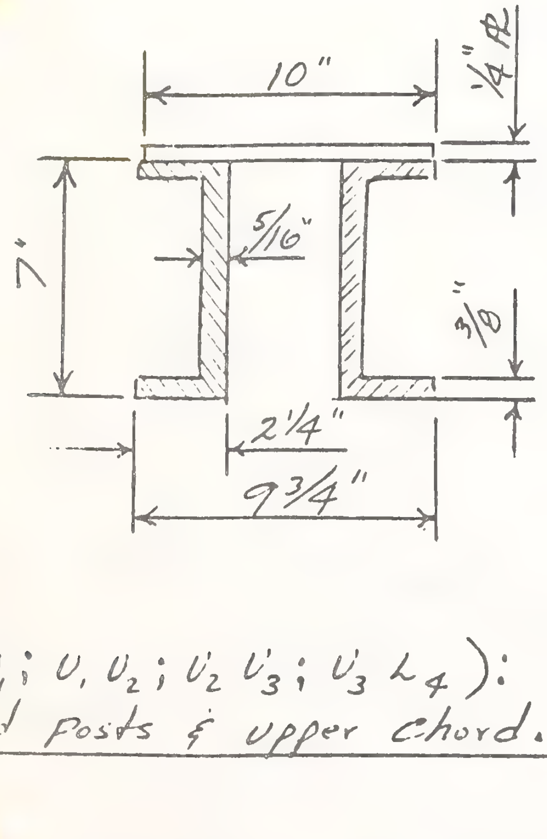
(USRS Main Canal)

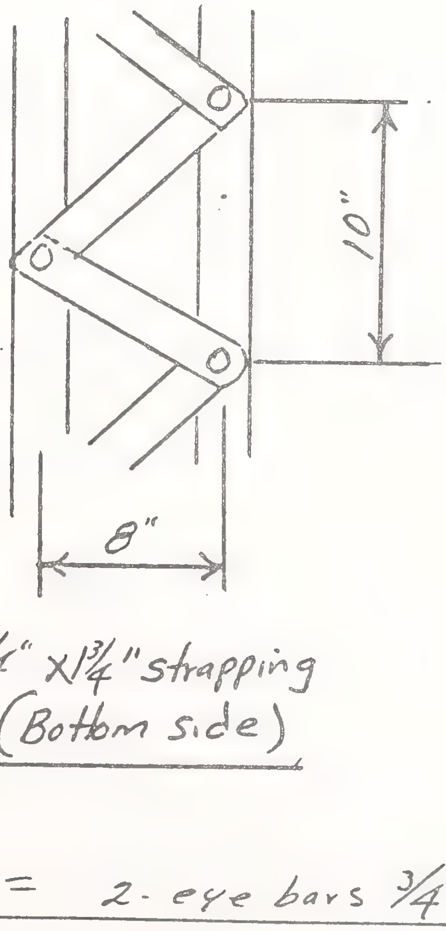
Str. Measurements: L42502-25.2

Sheet 1 of 3



From center of upstream truss to center of downstream truss = 19'-0"





($L_0 U_1$; $U_1 U_2$; $U_2 U_3$; $U_3 L_4$):
End posts & upper chord. ~ 1/4" X 1 3/4" strapping (Bottom side)

Lower chord ~ L_0 thru L_4: = 2-eye bars 3/4" x 2 1/2".

Diagonal Members ($U_1 L_2$; $L_2 U_3$): 2-eye bars 1/2" x 2".

($L_1 U_2$; $U_2 L_3$): 1- 1"(dia) Rod

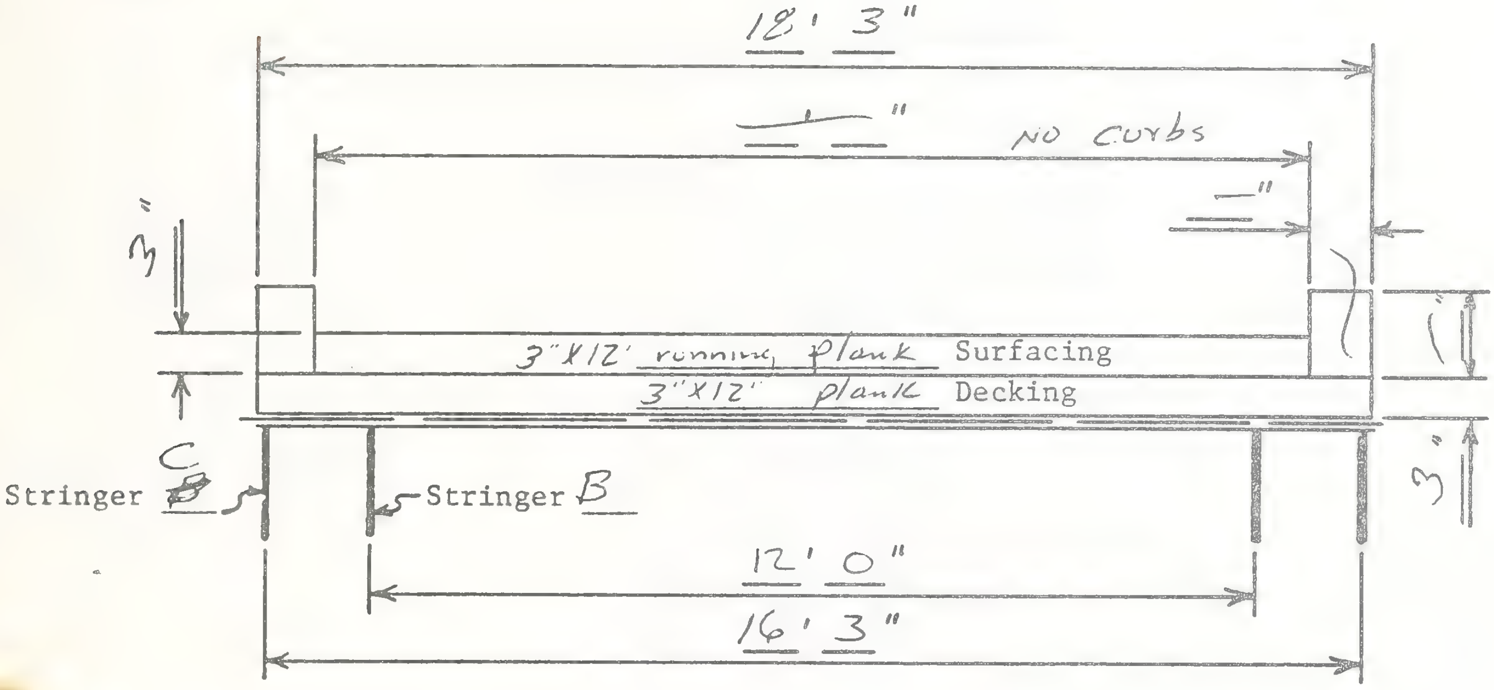
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Structure Number L42502 - 25.2 ~~L 17153 00940~~ 590 Span(s) Truss

Sheet 3 of 3

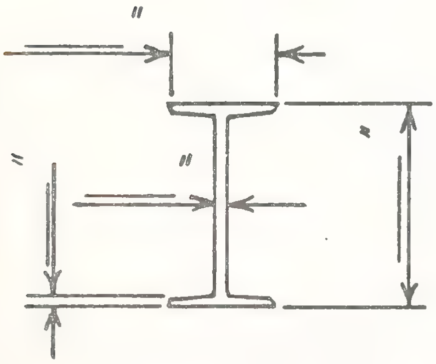
Inspector K.Q.

Date 7-23-79

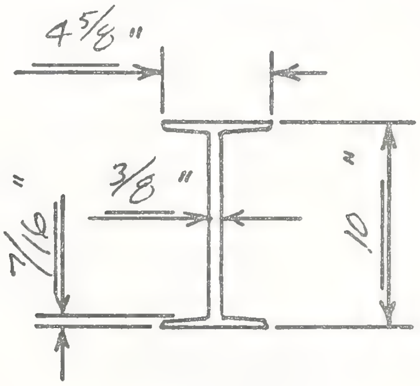


11 Stringers (total)

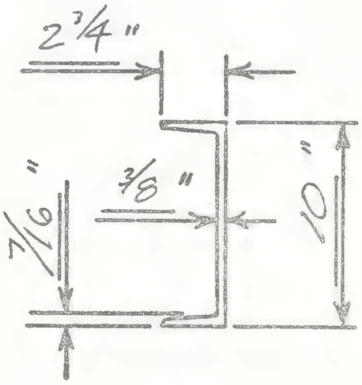
Span Length 56' 0"



STRINGER "A"



STRINGER "B"



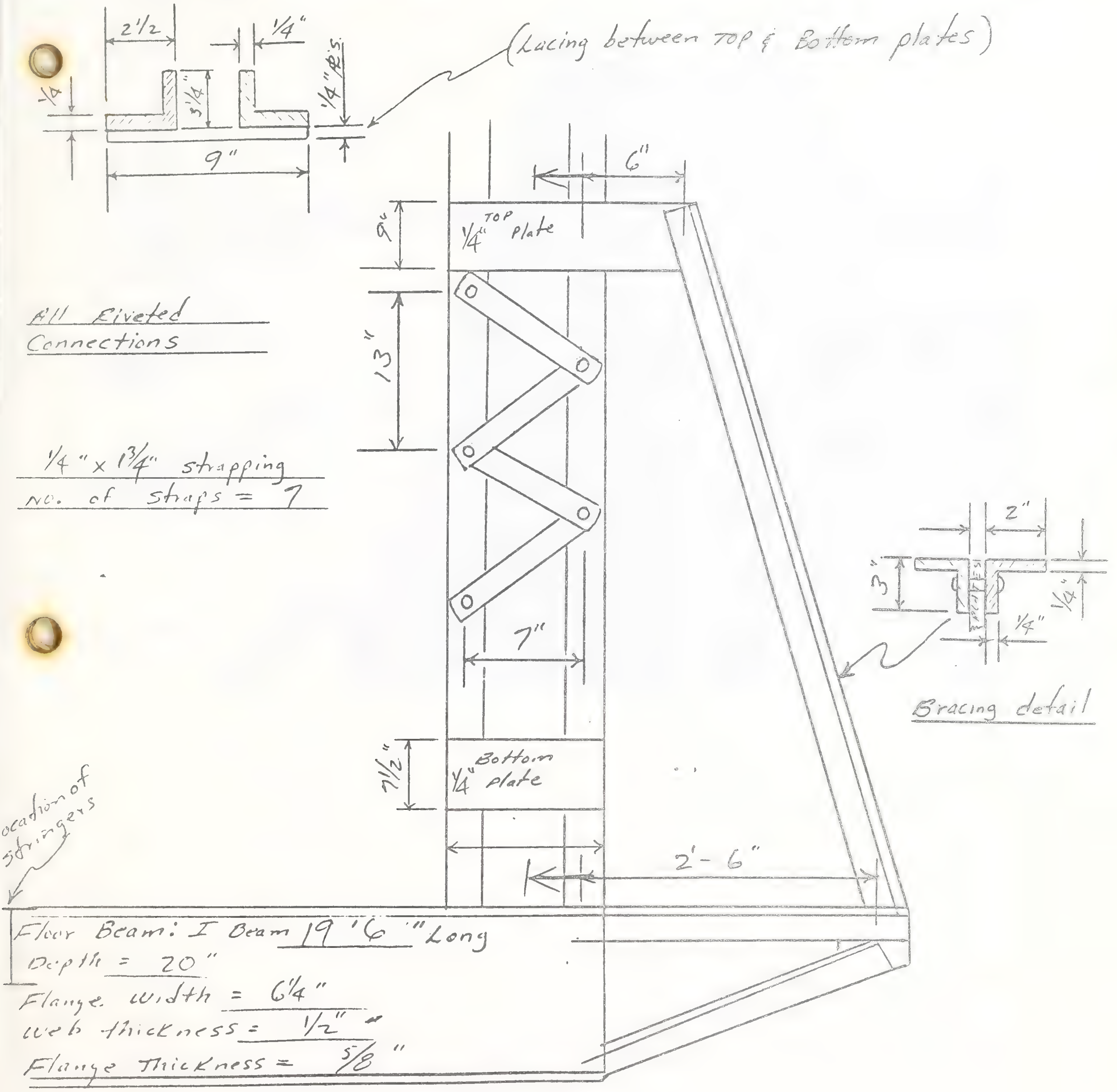
STRINGER "C"

Comments: stringers: Good Condition.

~~[illegible]~~ 590 USRS Miami Canal 7-23-77

TOP VIEW L42502-25.2

Sheet 2 of 3



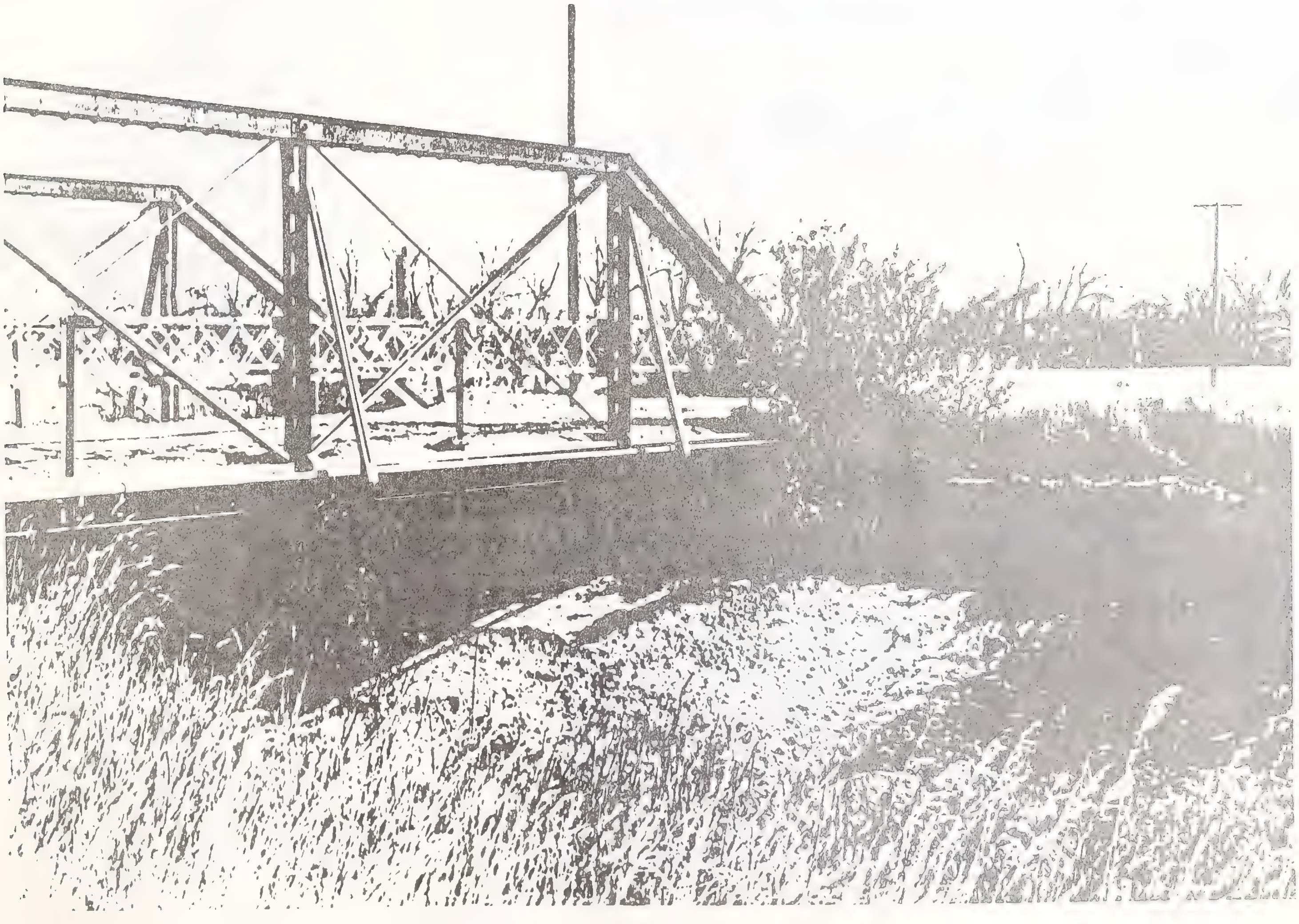
All Riveted Connections

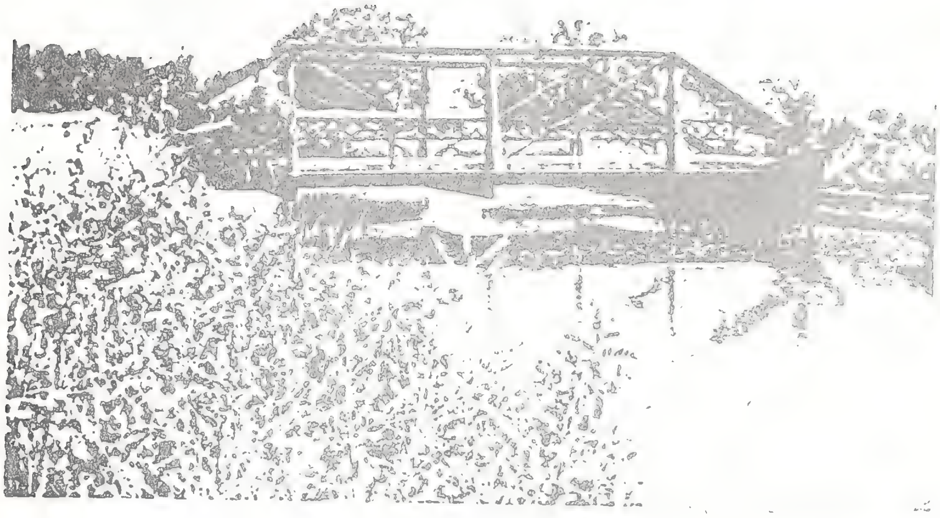
1/4" x 1 3/4" strapping
No. of straps = 7

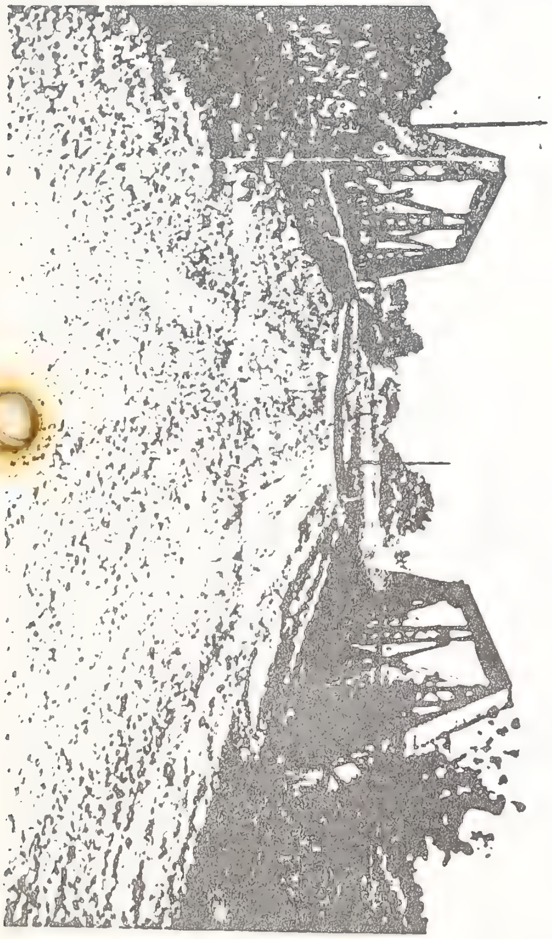
Floor Beam: I Beam 19'6" Long
Depth = 20"
Flange width = 6 1/4"
web thickness = 1/2"
Flange Thickness = 5/8"

Vertical Members & outside Bracing.
($U_1 L_1$; $U_2 L_2$; $U_3 L_3$):

MINN.

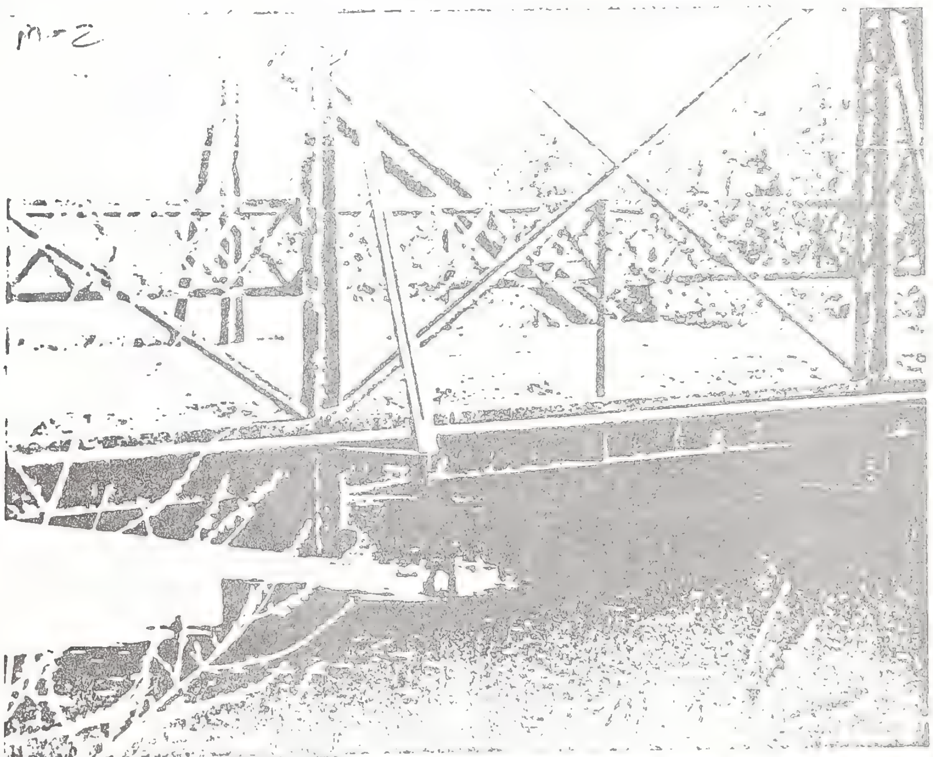




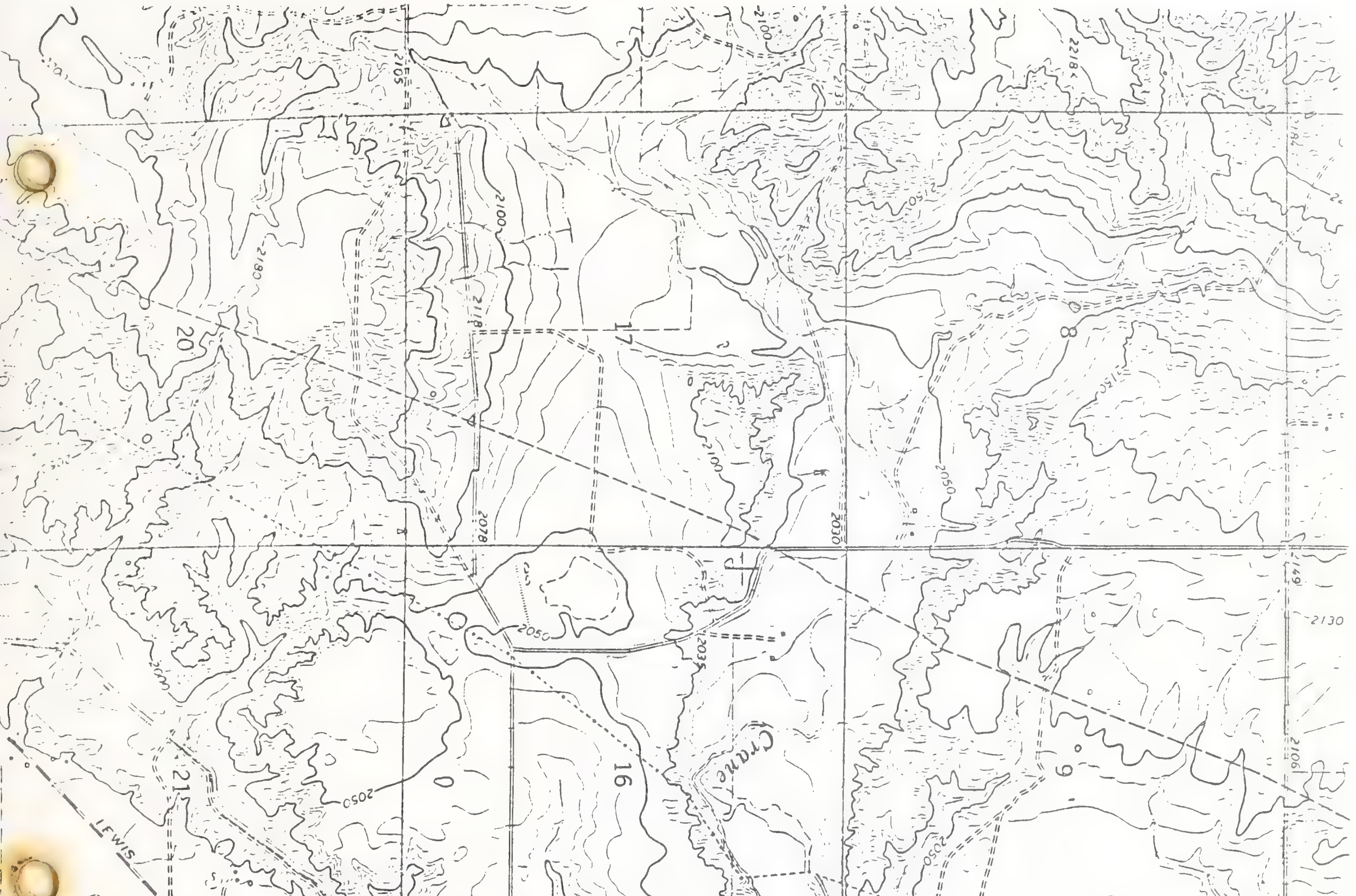


L-11

m-2



L-12



502-0.3
8-C Zone 13 555000E 5269185N
Crane, Mont. 1:24000 Contour 10''
SW¼NW¼SW¼ Sec. 15, T. 21 N.,R. 58 E.

MONTANA BRIDGE INVENTORY FORM

Site Number: 24RL169 Site Name: *USRS Canal Bridge, 1 Mi. N. Crane*
Structure Number: *L42 534 000+0.400-1 092-C* Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *Center N. Sec. Line, Sec. 15 T. 21 N., R. 58 E.*
UTM Zone: *13, 555575 E. 5270410 N.*
Quad Name: *Crane, Mont.* Scale: *1:24,000*
County/City: *Richland* Route *534* Mile Crossing *Main Canal*

OWNERSHIP: MDOH ☐ County/City ☒ Federal ☐ Private ☐ Tribal ☐
Specify Richland

PRESENT USE: *USRS Main Canal Bridge on county road.*

BASIC BRIDGE (check as appropriate)

- ☐ Beam, Slab, Girder
- ☐ Suspension
- ☐ Arch
- ☐ Movable
- ☒ Truss
  - ☒ Pin connected
  - ☐ Rigid

MATERIALS

- ☐ Wood
- ☒ Metal
- ☐ Combination
- ☐ Stone
- ☐ Reinforced Concrete
- ☐ Prestressed Concrete

TYPE

- ☐ Deck
- ☒ Pony
- ☐ Through
- ☐ Combination

TRUSS DESIGN

- ☐ King Post
- ☐ Queen Post
- ☐ Howe
- ☒ Pratt
  - ☐ Double Intersection
  - ☐ Half Hip
  - ☐ Parker
  - ☐ Camelback
  - ☐ Pennsylvania (Petit)
    - ☐ Sub Struts
    - ☐ Sub Ties
  - ☐ Baltimore
- ☐ Lenticular
- ☐ Warren
  - ☐ Verticles
  - ☐ Polygonal Chord
  - ☐ Double Intersecting
  - ☐ Quadrangular
- ☐ K
- ☐ Other

Length 54', Width *17.5'* No. spans *1* No. panels *4*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Lackawana Steel*
Builder/Contractor *Minneapolis Steel and Machinery Company*

PHOTOGRAPHIC RECORD

Roll 1, Frame 22; Roll 5, Frames 7 and 8

NARRATIVE DESCRIPTION

Plans for this bridge are in Specifications 136, Drawing 3 of 6. The lower chord is eyebars connected by a 2¼" pin to vertical members composed of two angle sections connecting by lacing bars. These are also pin-connected to the top chord of continuous steel plate which is riveted to two channel sections. Lacing bars connect the bottom flanges. Diagonals are eyebars and eyebars with turnbuckles. The I-beam floor beam and string system is held by a series of riveted connections. The double angle knee braces rise from these connections to the upper portion of the verticals, where they are riveted on with bars. The 18" guardrail has the familiar lattice work connecting two angle sections. Unfortunately, the approach ends are bent. After the bridge was first recorded in 1979, but before its 1981 review, this bridge was the victim of vandalism. White spray paint names and lines seriously detract from the bridge's historic appearance.

NARRATIVE HISTORY

The U.S. Reclamation Service did not plan or build a bridge here. This one was moved at an undetermined time to its present location. Plans show 6 four-panel heavy steel pony trusses that were to have been built by Minneapolis Steel and Machinery Company, that are not currently in those stations. One of these, the recent records show, was actually a Queen Post or 3-panel. That leaves 5, only one of which was to have been a 56' one. Station 970, where the 56' four-panel heavy truss was to have been, is just north of Savage on Route #16, the main road from Glendive to Fairview. In 1974 a prestressed concrete beam 95' long was constructed there. Likely the old bridge was moved out by the county and placed here at that time.

INTEGRITY *Average. It has a bent guardrail. Sufficiency rating in 1986 was 72.6.*

Altered Unaltered Moved *Yes* Date
Summary of Move: *The bridge was here when sufficiency ratings were first completed in 1979.*

SIGNIFICANCE

As one of the original USRS canal bridges, it is significant. Since it was moved, however, it is not eligible for listing on the National Register of Historic Places. The bent guardrail and the spray paint vandalism also detract from its historic appearance.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 21, 1988*

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Canal and road construction have drastically altered the land form.*

Was historical/architectural survey conducted around the structure?

Yes X No __

Results negative X

Comments: *An older farming complex is north and east 250' to 500' and was not recorded.*

EV:cm:5/uu

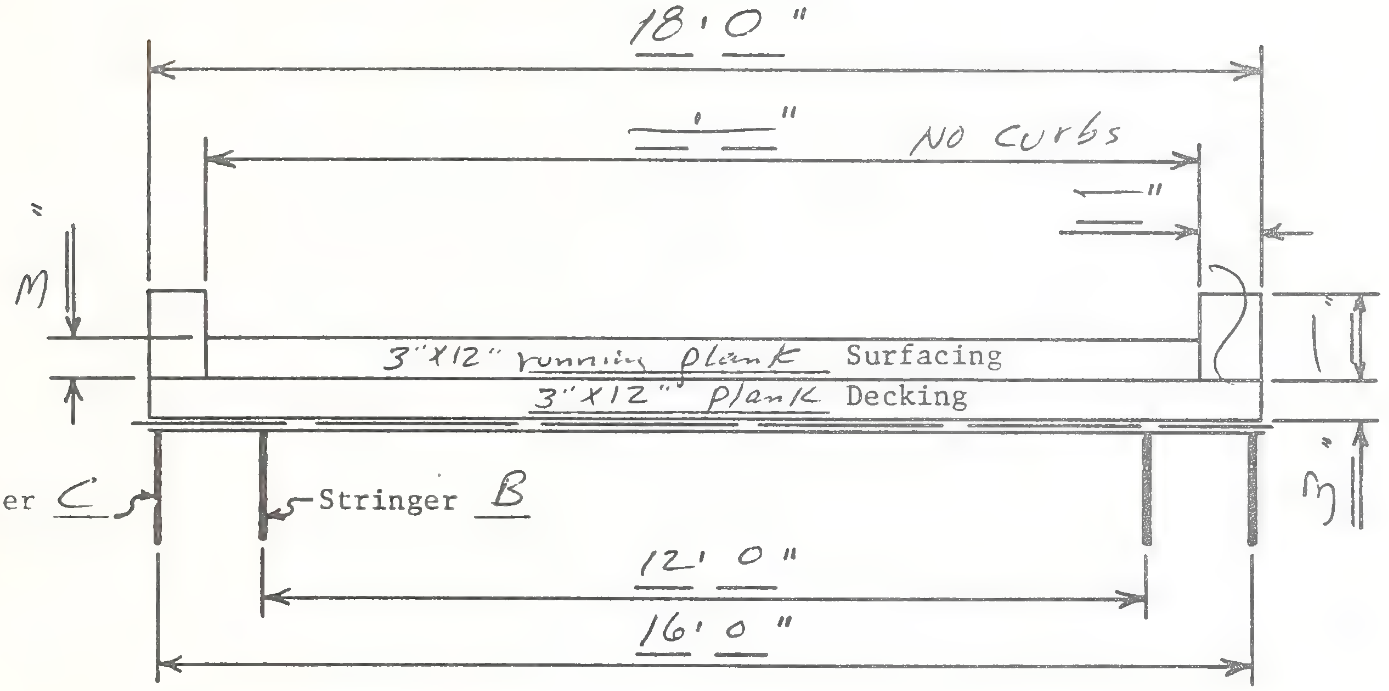
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Structure Number L 42531 ~~L 12 26~~7 CCC+C.400 Span(s) Truss

Sheet 3 of 3

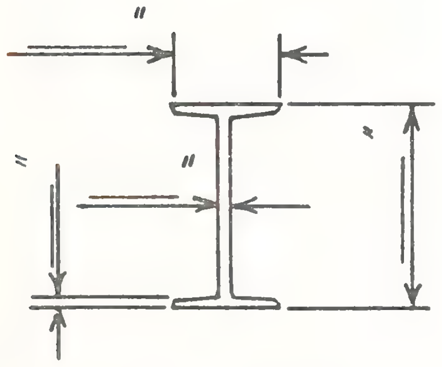
Inspector K.G.

Date 7-23-79

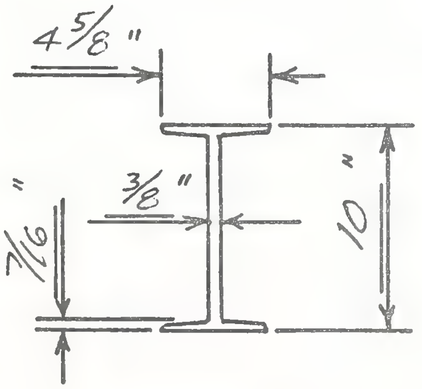


11 Stringers (total)

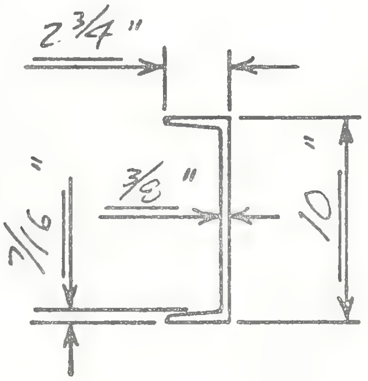
Span Length 56' 0"



STRINGER "A"



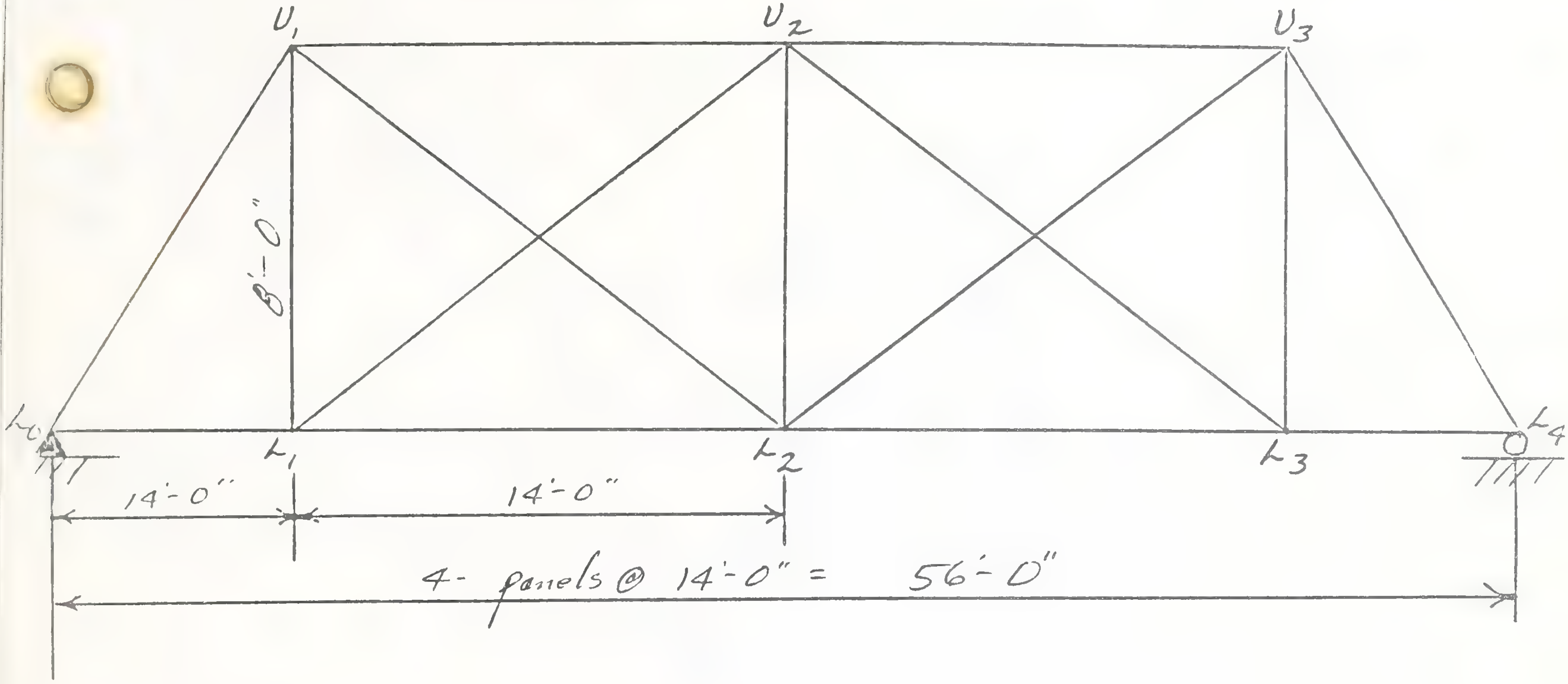
STRINGER "B"



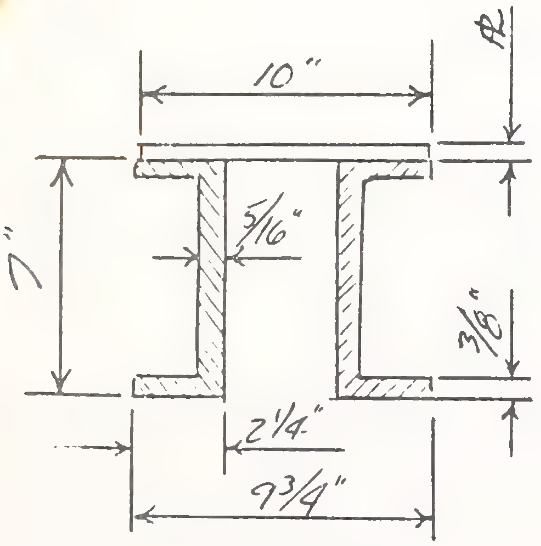
STRINGER "C"

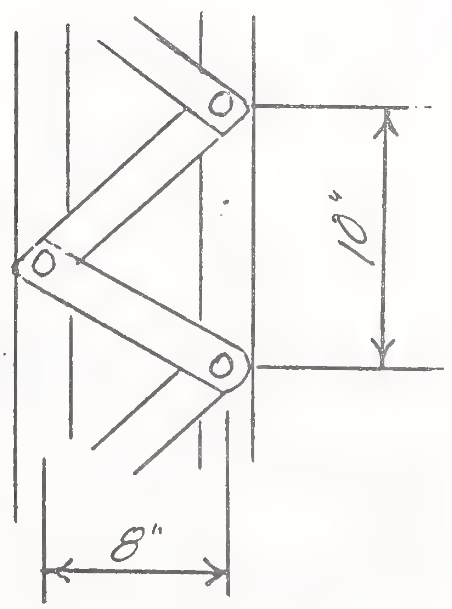
Comments: stringers are in Fair Condition

Str. Measurements: L42534-0.4 Sheet 1 of 3



From Center of upstream truss to Center of downstream truss = 19'-0"





($L_0 U_1$; $U_1 U_2$; $U_2 U_3$; $U_3 L_4$): 1/4" x 1 3/4" strapping
End posts & upper chord. ~ (Bottom side)

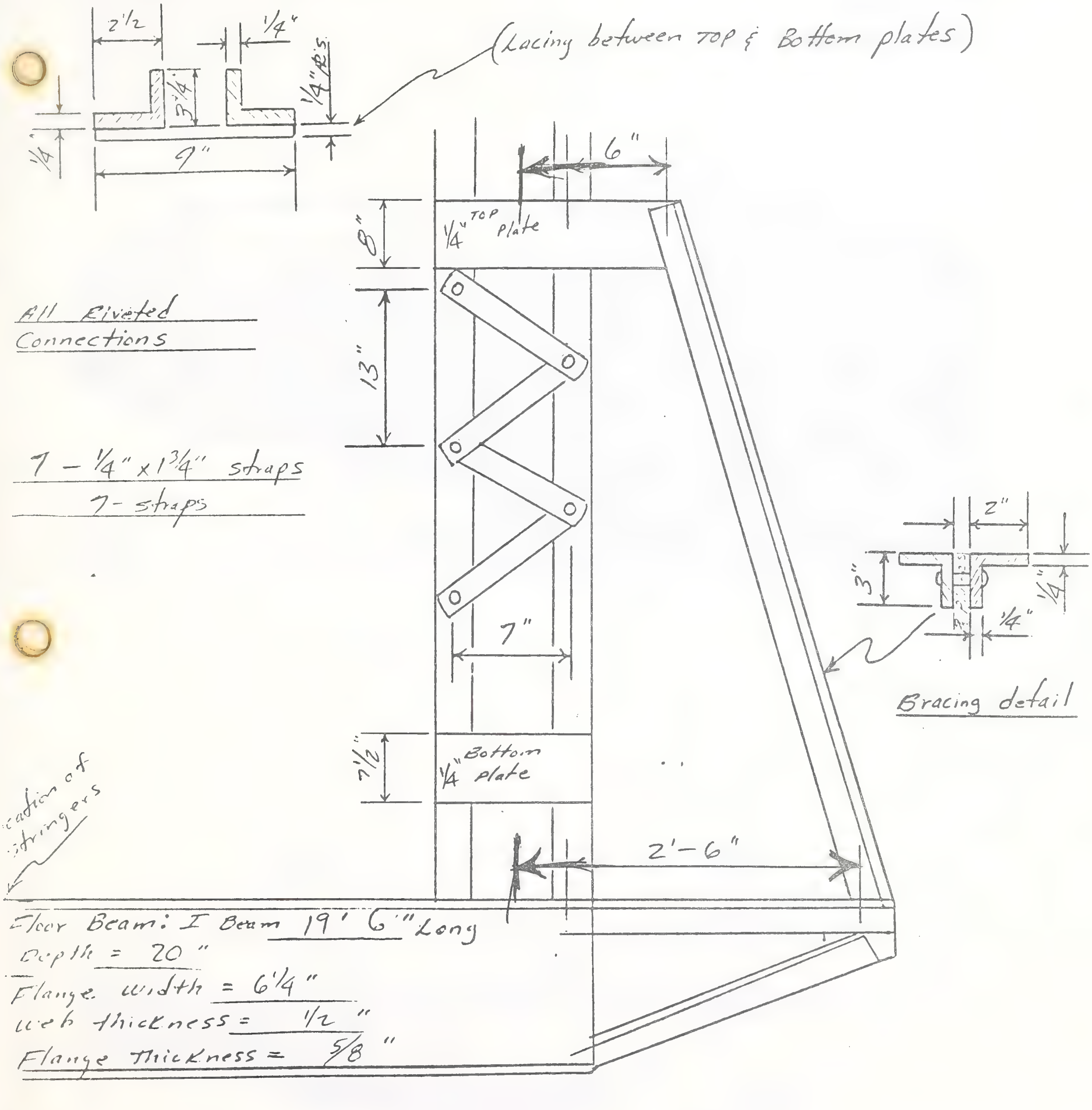
Lower chord: 2- eye bars 3/4" x 2 1/2".

Diagonal Members: ($U_1 L_2$; $L_2 U_3$): 2 eye bars 1/2" x 2".

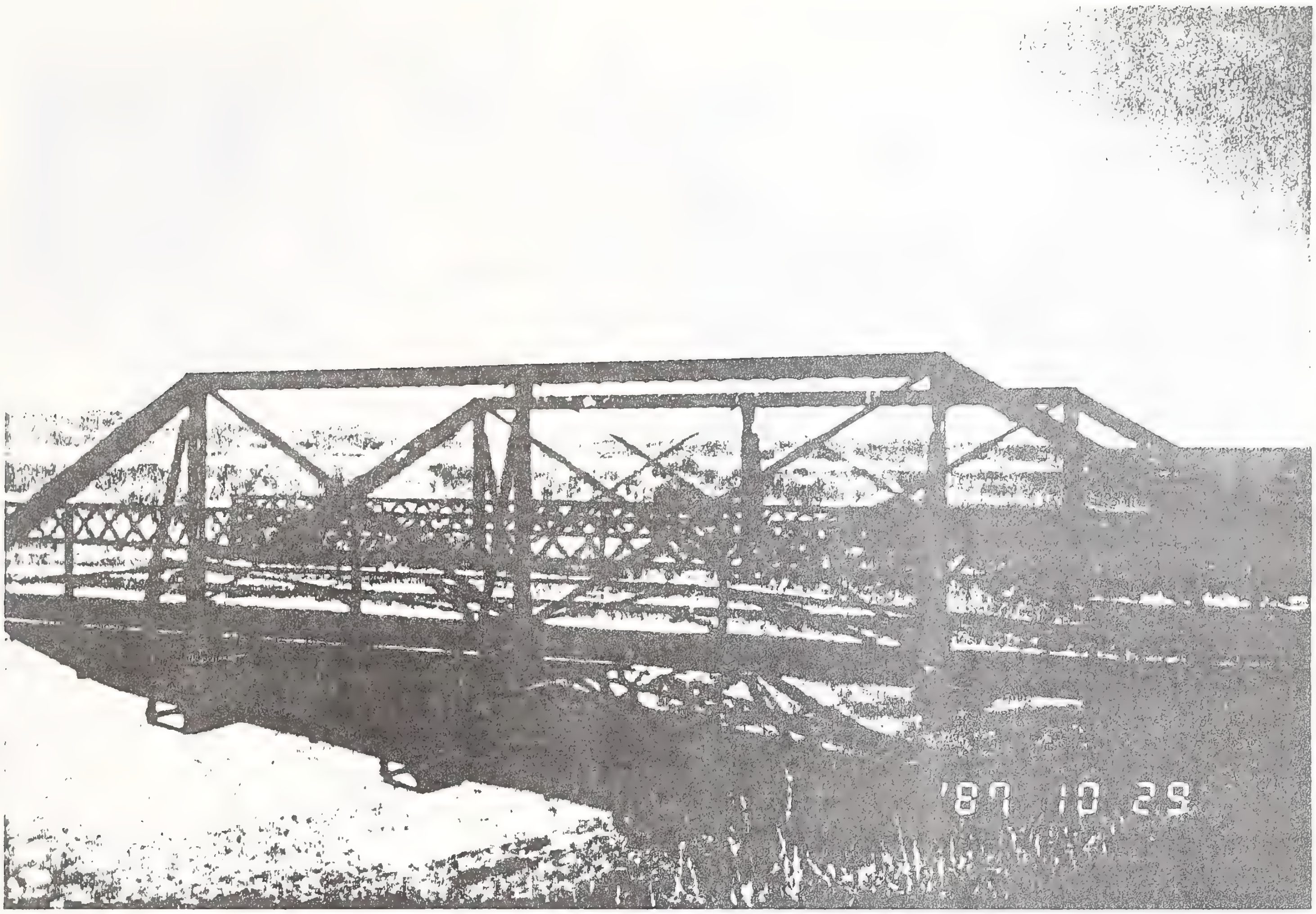
($L_1 U_2$; $U_2 L_3$): ~~2~~ one - 1" (dia) Rod

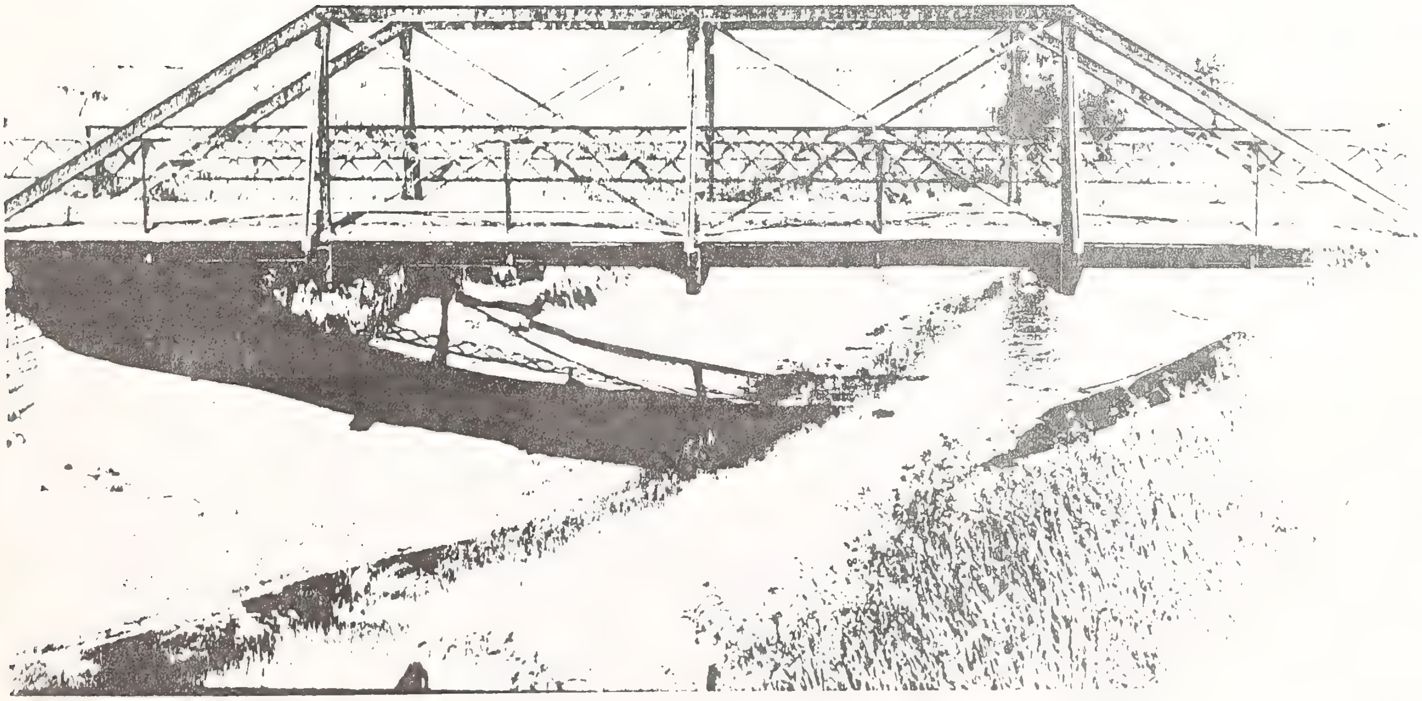
~~[illegible]~~ [illegible] (USRS Main Canal) [illegible]

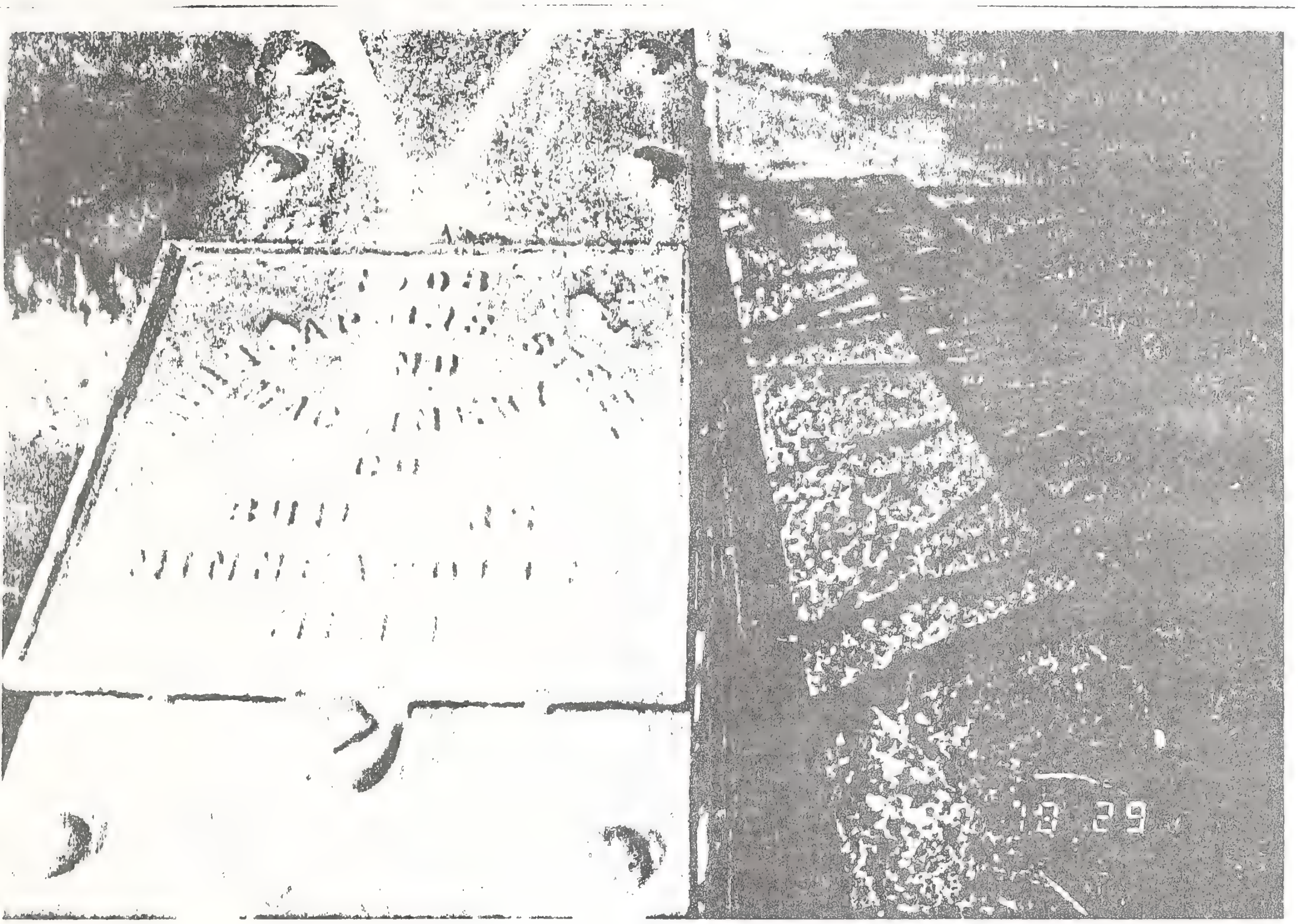
TOP VIEW L42534 Sheet 2 of 3

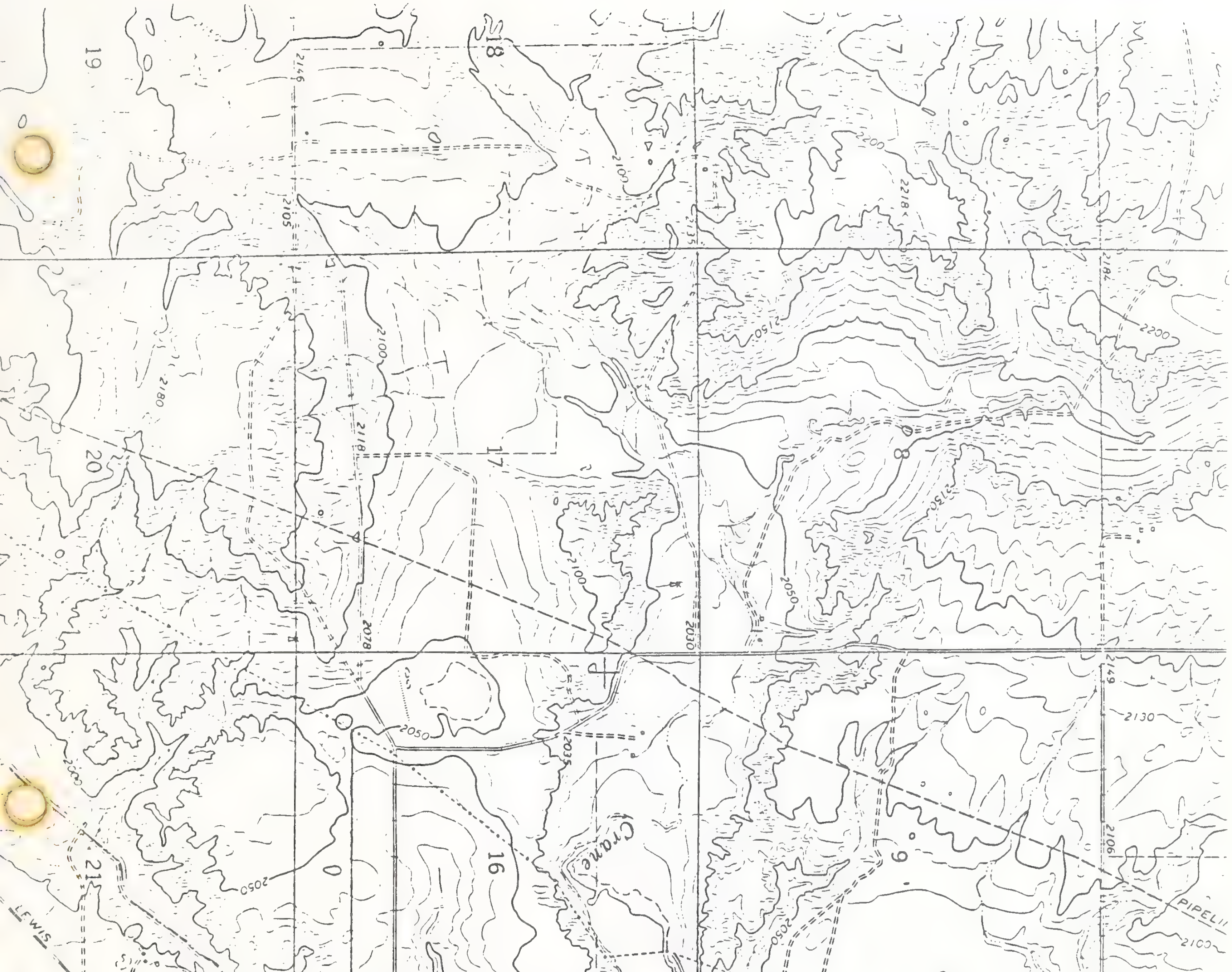


Vertical Members & outside Bracing.
(U_1L_1; U_2L_2; U_3L_3).


'87 10 29




10 29



534-0.4

92-C Zone 13 555575E 5270410N
Crane, Mont. 1:24000 Contour 10'
Center N Sec line 15, T. 21 N.,R. 58 E.

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL* 170 Site Name: *USRS Canal Bridge at Jenks (Newlon)*
Structure Number: *L42 504 002+0.000-1 005-C* Year Built: *1908*
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *NW¼NE¼NW¼, Sec. 26 T. 22 N. R. 58 E.*
UTM Zone: *13, 556830 E. 5276875 N.*
Quad Name: *Sidney, Mont.* Scale: *1:24,000*
County/City: *Richland* Route *504* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Richland

PRESENT USE: *USRS Canal bridge on a county road.*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
  X Pin connected
  __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
X Pony
__ Through
__ Combination

TRUSS DESIGN

__ King Post
__ Queen Post
__ Howe
X Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
  K
__ Other

Length 54' Width *17.5'* No. spans *1* No. panels *4*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Services, A.P. Davis, Chief Engineer*
Fabricator *Lackawana Steel*
Builder/Contractor *Minneapolis Steel and Machinery Company, Minneapolis, MN*

PHOTOGRAPHIC RECORD

Roll 5, Frames 3, 4, 5

NARRATIVE DESCRIPTION

Plans for this bridge are found in Specifications 136, Drawing 3 of 6. It is a 56' steel single span, pin-connected Pratt Pony truss. It measures 17.5' wide and has four panels 14' each, standing 8' high. The lower chord is made of eyebars connected by 2¼" pins to the vertical members of two angle sections connected by lacing bars. The upper chord is a continuous steel plate riveted to two channel section, with lacing bars on the bottom flanges. The counters are two eyebars or eyebars with turnbuckles. The knee braces are riveted to the I-beam floor beams, then with gussett plates, are connected to the upper vertical. They are of two angle sections riveted together. The guardrail is the original two angle sections with lattice pattern. One end is broken off.

NARRATIVE HISTORY

This is Station 1880. A heavy 54' truss was scheduled to be built here, but it is actually 56' long. No doubt changes had to be made as construction proceeded to assure a good fit. In the narrative final report on the project in 1910, the USRS Chief Engineer had to explain enormous cost overruns. Two of the numerous reasons cited had to do with bridges. First, he said that lumber delivered to the bridge sites was "lost" and had to be reordered, and that some bridges had to be re-built, as they were built too small. Minneapolis Steel and Machinery Co. bid $17,885 on the heavy bridge, but the cost was recorded at $22,561.79. The increase would have covered only the steel bridge and labor, as the lumber was purchases separately and supplied to the contractor.

This bridge is west of Newlon, which appeared on the USRS map. A construction camp was located here, but it never became a real community. When the railroad came through in 1912, Jenks was the name given the station, which sat between this bridge and Newlon (see USGS map attached). Although two rails met here, the place never thrived as a transportation center, as had been expected.

INTEGRITY *Diminished by partial loss of the lattice guardrail. Sufficiency rating was 58 in 1986.*

Altered Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

The bridge is significant as one of the USRS canal bridges. Its appearance is altered by the loss of a guardrail on one approach and by spray paint vandalism.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 21, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Canal and road construction have previously disturbed the surface.*

Was historical/architectural survey conducted around the structure?

Yes X No __

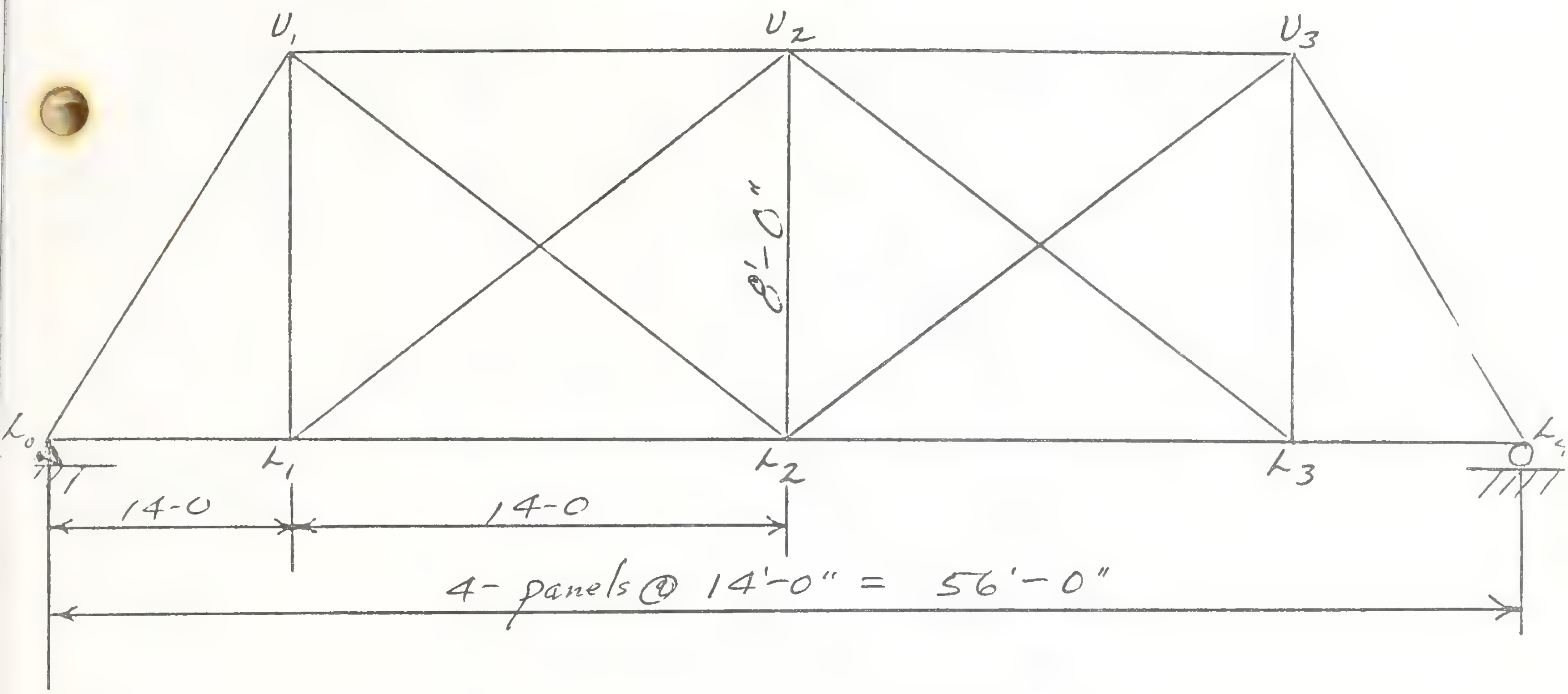
Results negative X

Comments: *A modern structure, built after the 1974 update of the USGS map, is situated on the west side of the canal, north of the road.*

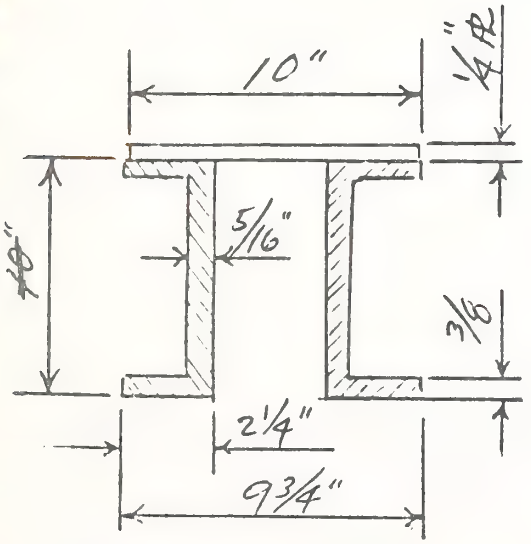
EV:cm:5/vv

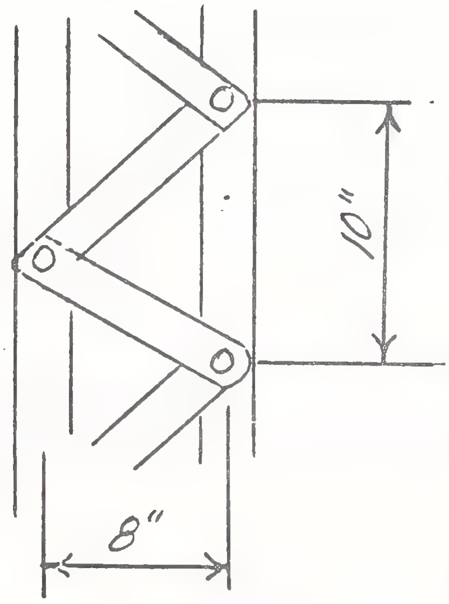
Str. Measurements: L42504-2.0

Sheet ___ of ___



From center of upstream truss to center of downstream truss = 19-0"





(L_0U_1; U_1U_2; U_2U_3; U_3L_4):
End posts & upper chord.

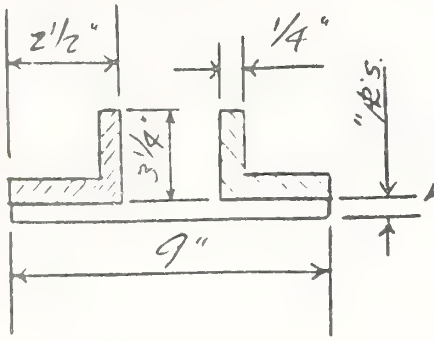
(1/4" x 1 3/4" strapping
(Bottom side))

Lower Chord- 2-eye bars 3/4" x 2 1/2"

Diagonal Members-(U_1L_2; L_2U_3): 2-eye bars 1/2" x 2"

(L_1U_2; U_2L_3): ~~1~~ one 1"(dia) Rod.

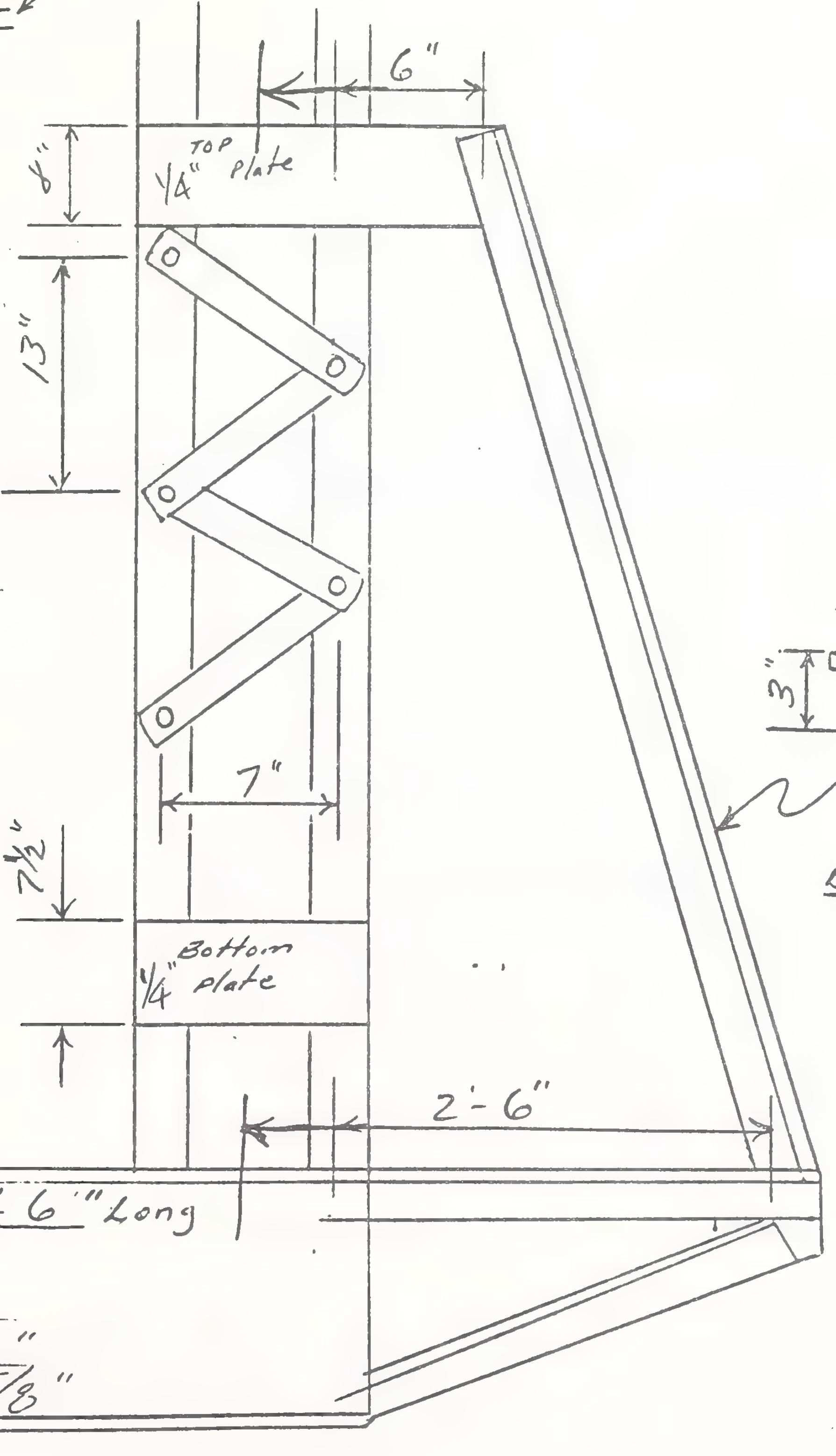
TOP VIEW

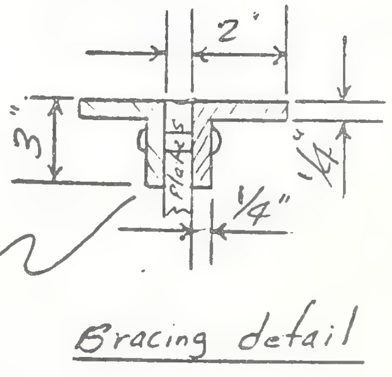


(Lacing between TOP & Bottom plates)

All Riveted Connections

¼" x 1¾" strapping
No of straps = 7





Bracing detail

Location of stringers

Floor Beam: I Beam 19'-6" Long
Depth = ~~6¼~~" 20"
Flange width = 6¼"
web thickness = ½"
Flange Thickness = ⅝"

Vertical Members & outside Bracing.
($U_1 L_1$; $U_2 L_2$; $U_3 L_3$).

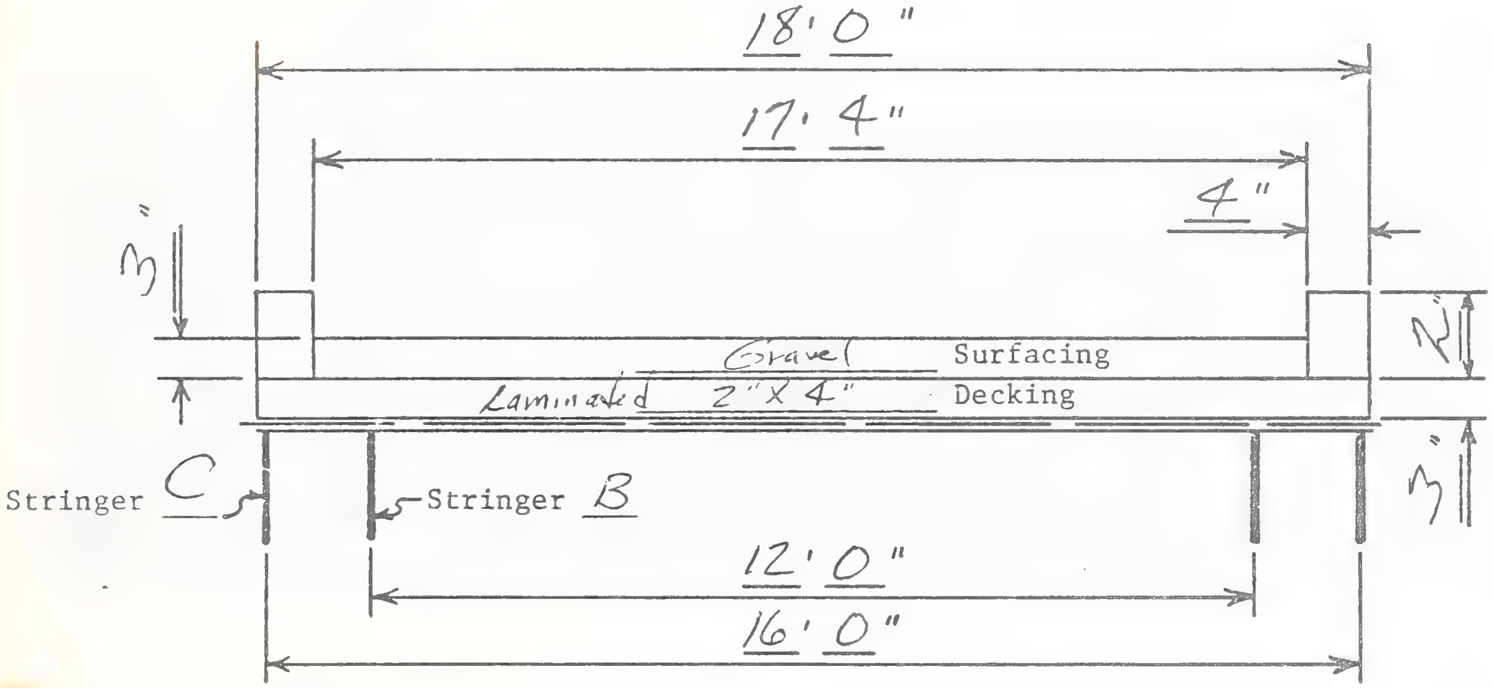
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

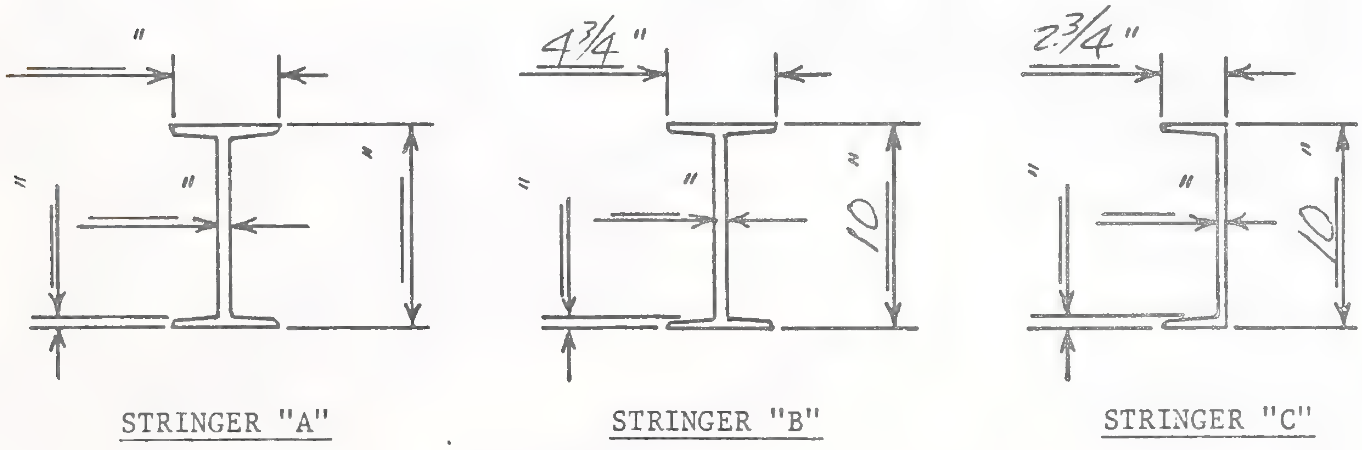
Structure Number ~~[illegible]~~ L42504-2.0 Span(s) Truss

Inspector KG.

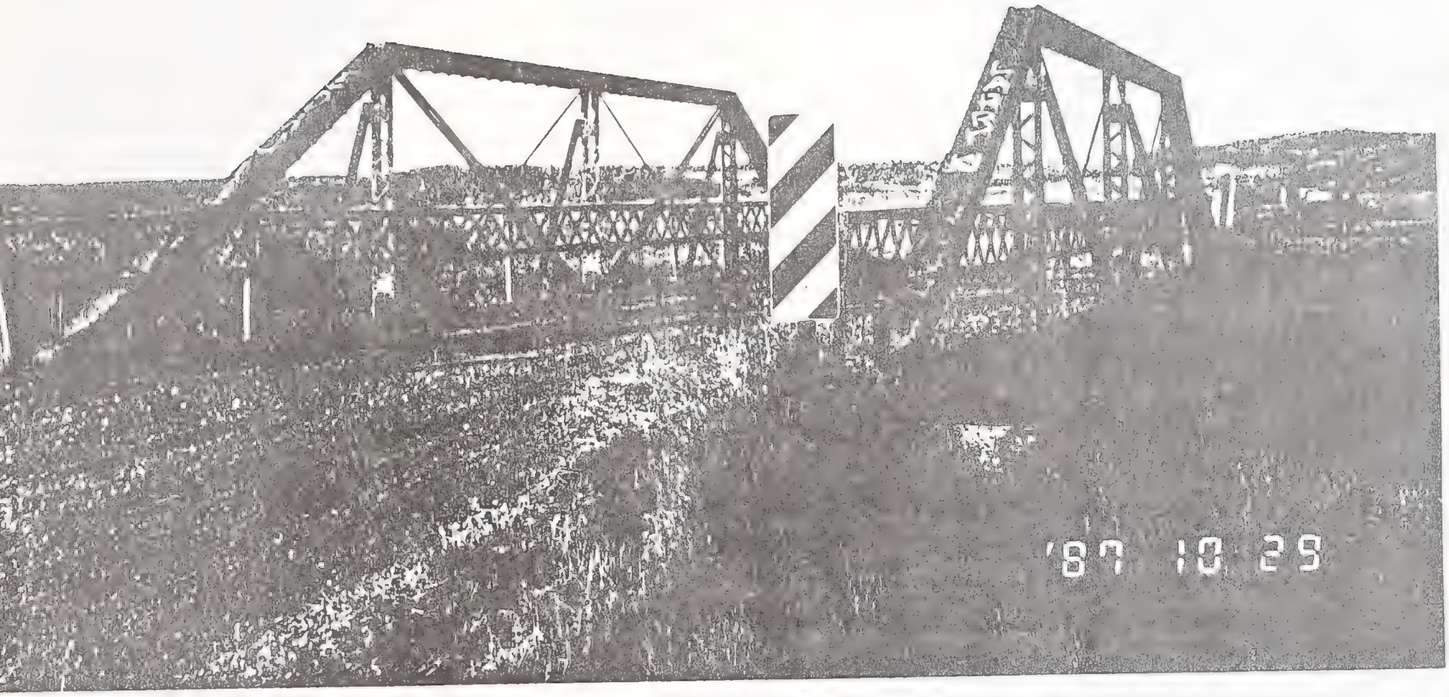
Date 7-23-79

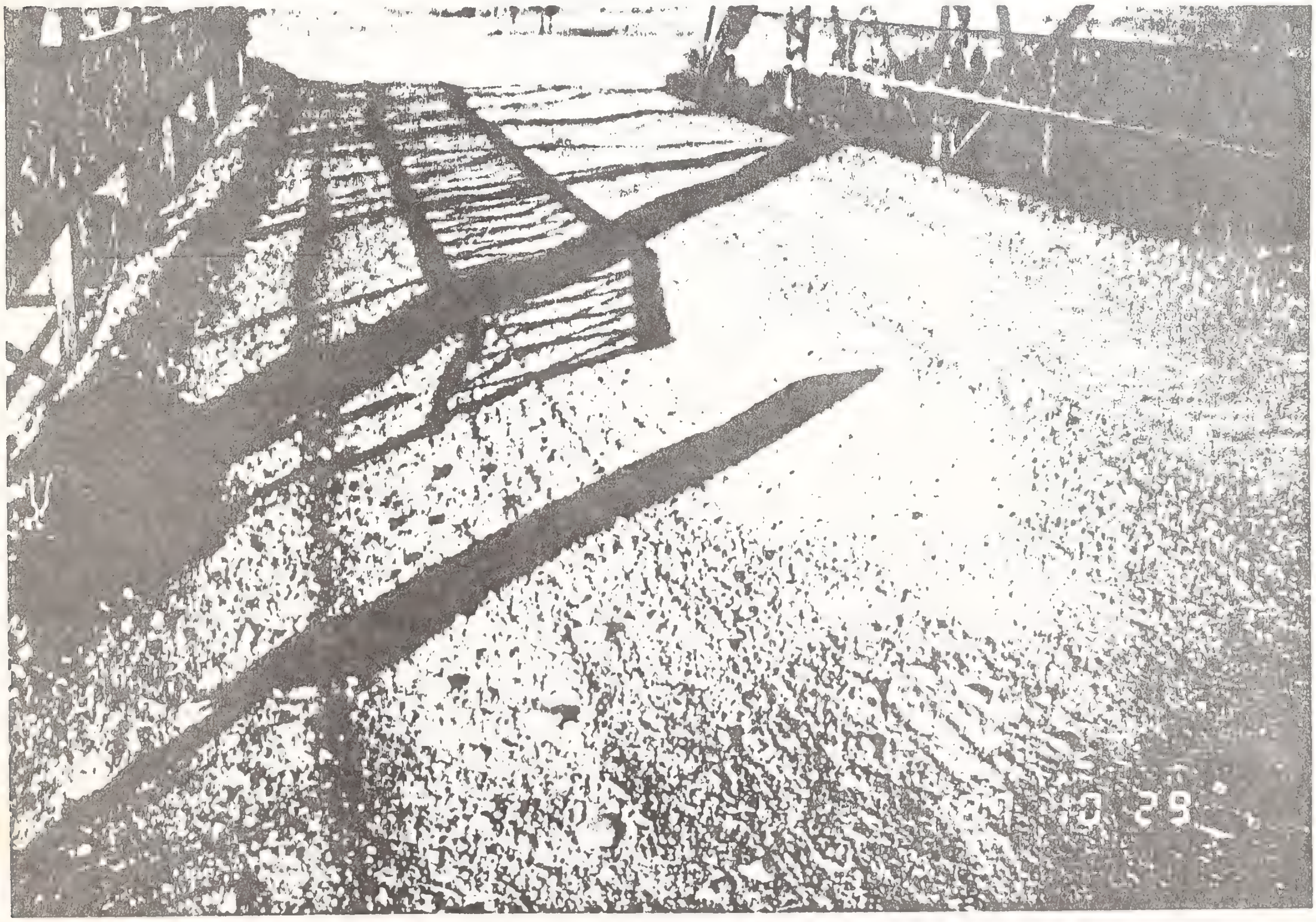


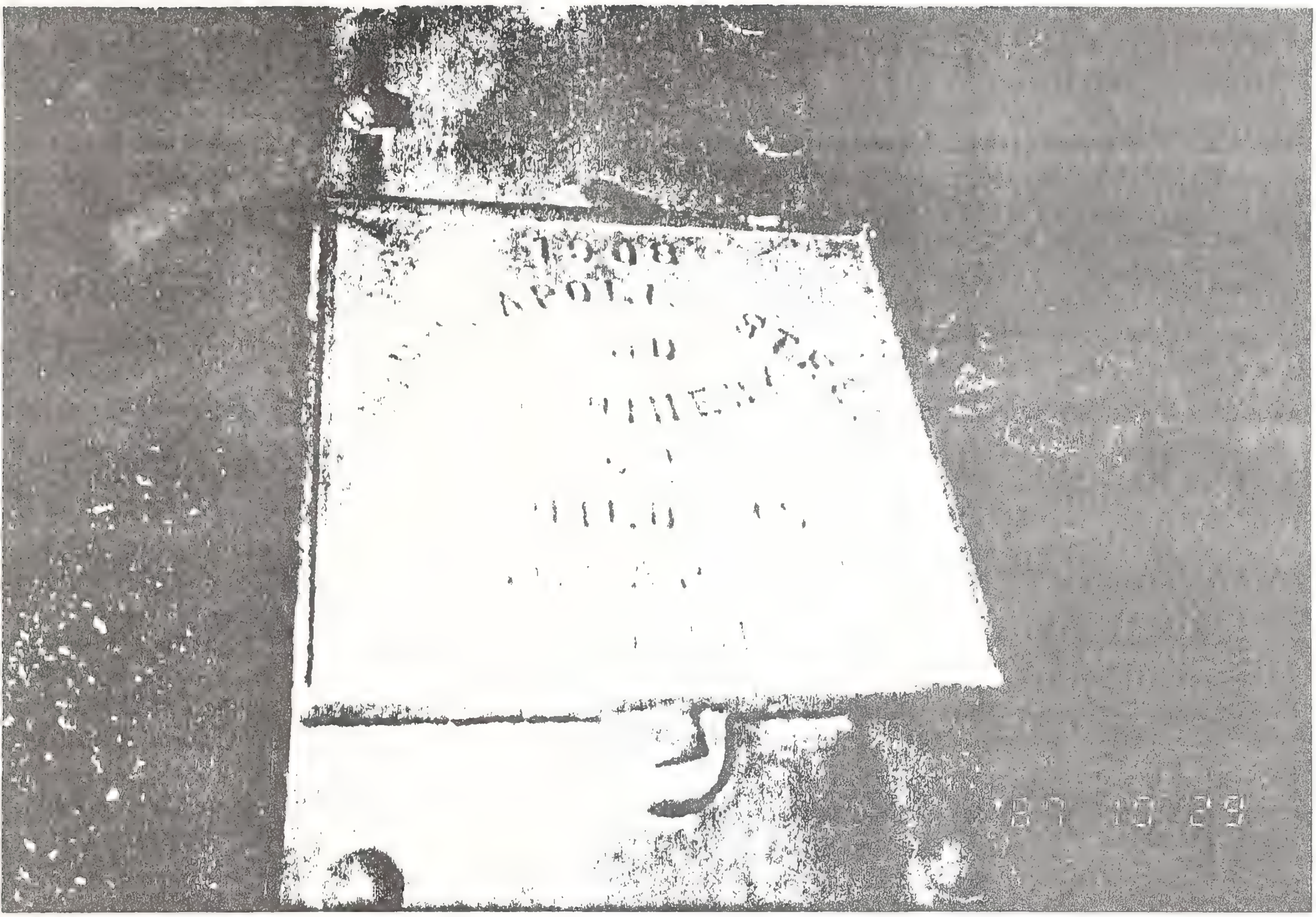
11 Stringers (total)   Span Length 56' 0"

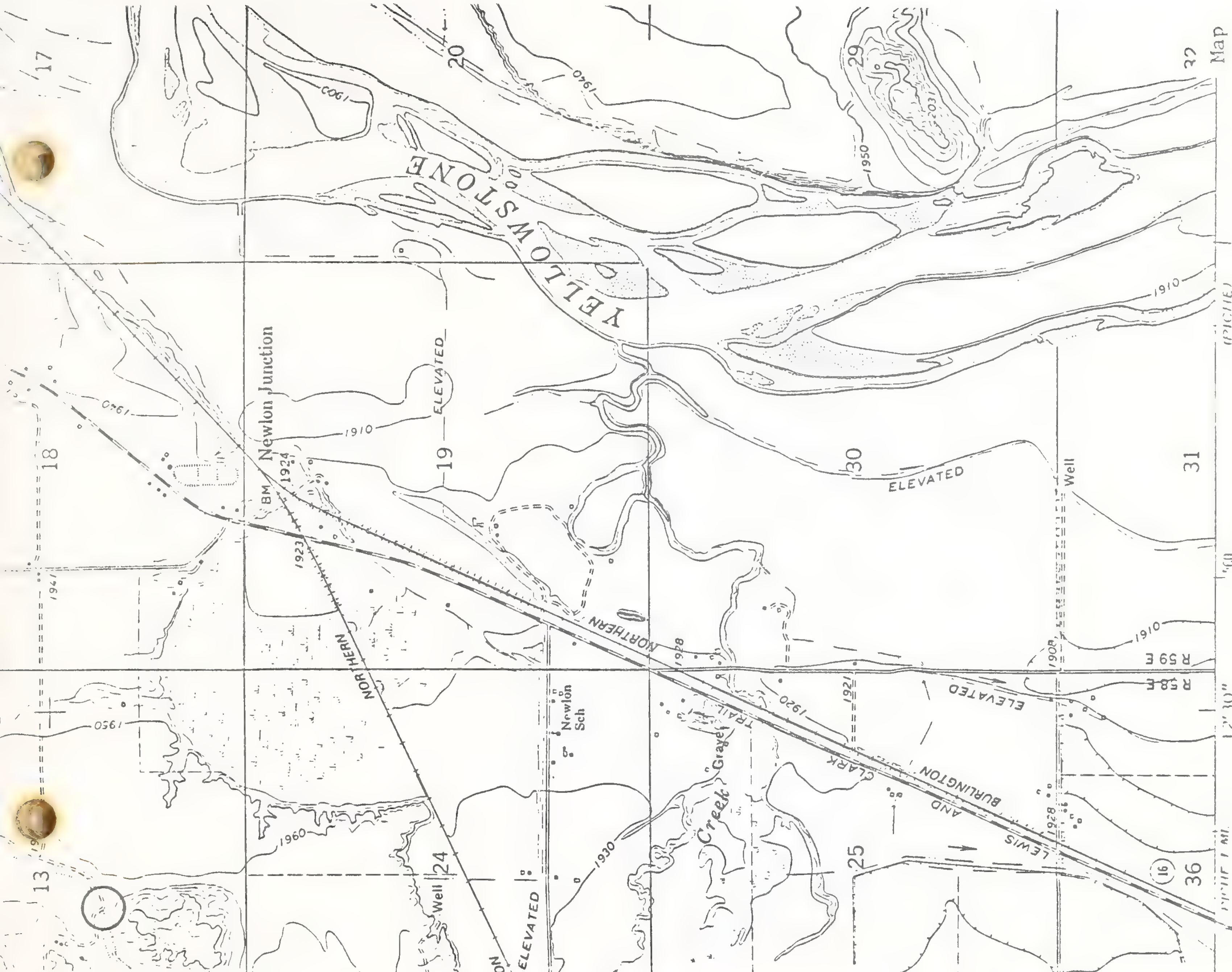


Comments: stringers are in Fair Condition


'87 10 29


10 29


'87 10 29



504-2.0
5-C Zone 13 556830E 5276875N
Sidney, Mont. 1:24000 Contour 10'
NW¼NE¼NW¼ Sec 26, T. 22 N., R. 58 E.

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL*171
Site Name: *USRS Canal Bridge, 4 Mi. S.W. Sidney*
Structure Number: *L 42 513 003+0.600-1 004-C*
Year Built: *1908*
Evaluation
Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *SE¼NE¼SW¼, Sec. 13 T. 22 N., R. 58 E.*
UTM Zone: *13,* 558660E 5279110 N.
Quad Name: *Sidney, Mont.*
Scale: *1:24,000*
County/City: *Richland* Route *513* Mile Crossing *Main Canal*

OWNERSHIP: MDOH ☐ County/City ☐ Federal ☐ Private ☒ Tribal ☐
Specify Leroy Staffanson, Sidney, MT

PRESENT USE: *USRS Canal Bridge*

BASIC BRIDGE (check as appropriate)

- ☐ Beam, Slab, Girder
- ☐ Suspension
- ☐ Arch
- ☐ Movable
- ☒ Truss
  - ☒ Pin connected
  - ☐ Rigid

MATERIALS

- ☐ Wood
- ☒ Metal
- ☐ Combination
- ☐ Stone
- ☐ Reinforced Concrete
- ☐ Prestressed Concrete

TYPE

- ☐ Deck
- ☒ Pony
- ☐ Through
- ☐ Combination

TRUSS DESIGN

- ☐ King Post
- ☐ Queen Post
- ☐ Howe
- ☒ Pratt
  - ☐ Double Intersection
  - ☐ Half Hip
  - ☐ Parker
  - ☐ Camelback
  - ☐ Pennsylvania (Petit)
    - ☐ Sub Struts
    - ☐ Sub Ties
  - ☐ Baltimore
- ☐ Lenticular
- ☐ Warren
  - ☐ Verticles
  - ☐ Polygonal Chord
  - ☐ Double Intersecting
  - ☐ Quadrangular
  - ☐ K
- ☐ Other

Length *52'* Width *18'* No. spans *1* No. panels *4*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Lackawana Steel*
Builder/Contractor *Minneapolis Steel and Machinery Company*

PHOTOGRAPHIC RECORD

Roll 3, Frames 0 and 1 (Color)

NARRATIVE DESCRIPTION

It should be noted initially that this bridge was out of commission and undergoing repairs when visited in late October 1987. It is a 52' pin-connected Pratt Pony truss with 4 panels, 13' each. It is 18' wide and 8' high from the bottom chord, according to the State Bridge File. The deck was removed, exposing the 12 steel stringer I-beam system. New I-beam floor beams had been installed. The bottom chord is of eyebars, and the top chord is a continuous steel plate riveted to two channel sections connected by lacing bars along the bottom flanges. The vertical members are two angle sections with lacing bars, while the diagonals are forged steel eyebars and eyebars with turnbuckles. The knee braces were double angle sections riveted to the floor beam and by gussett plate to the upper vertical. The brace for the center vertical was missing on both sides. The lattice guardrail was also missing. The plank deck was being removed, and Mr. Staffanson was contemplating installing a concrete deck.

NARRATIVE HISTORY

The Yellowstone Project was never peopled as originally expected, a farm each 80 acres, and holding average much greater now. Naturally bridges were needed where they had not been placed, and in other situations, were not needed where built. The significant location changes, however, are more related to traffic patterns. Those on high use areas while fine for the wagon road they were constructed for, were not sufficient for modern heavy traffic. This bridge was located on what became Route 16 between Culbertson and Sidney. In 1937 it was removed, and a 75' timber stringer replaced it. The 52' heavy truss was probably stockpiled until the Staffanson's acquired it and moved it up-canal about 4 miles. Apparently it fit the new location well.

INTEGRITY *Poor. The guardrail is completed missing. The 1986 sufficiency rating of 43.2 is outdated by recent rehabilitation.*

Altered *X* Unaltered Moved *Yes* Date *1946*
Summary of Move: *Mr. Staffanson bought the bridge from the Bureau of Reclamation in 1946 when they removed in from its location at the Fairgrounds. He paid the bureau to move it here for his private use. The Staffanson's still maintain it.*

SIGNIFICANCE

As a USRS canal bridge it is significant historically. The move in 1946, and the loss of its distinctive latticed guardrail are serious losses of integrity, rendering it ineligible.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson*
Department of Highways
Date: *January 22, 1988*

Was Archaeological survey conducted around the structure?

Yes _X_ No __

Results negative _X_

Comments: *Surface disturbance from canal and road construction and from leveling fields for irrigation, has precluded the possibility of finding in tact cultural resources.*

Was historical/architectural survey conducted around the structure?

Yes _X_ No __

Results negative _X_

Comments: *No structures are near the bridge.*

EV:cm:1/aa

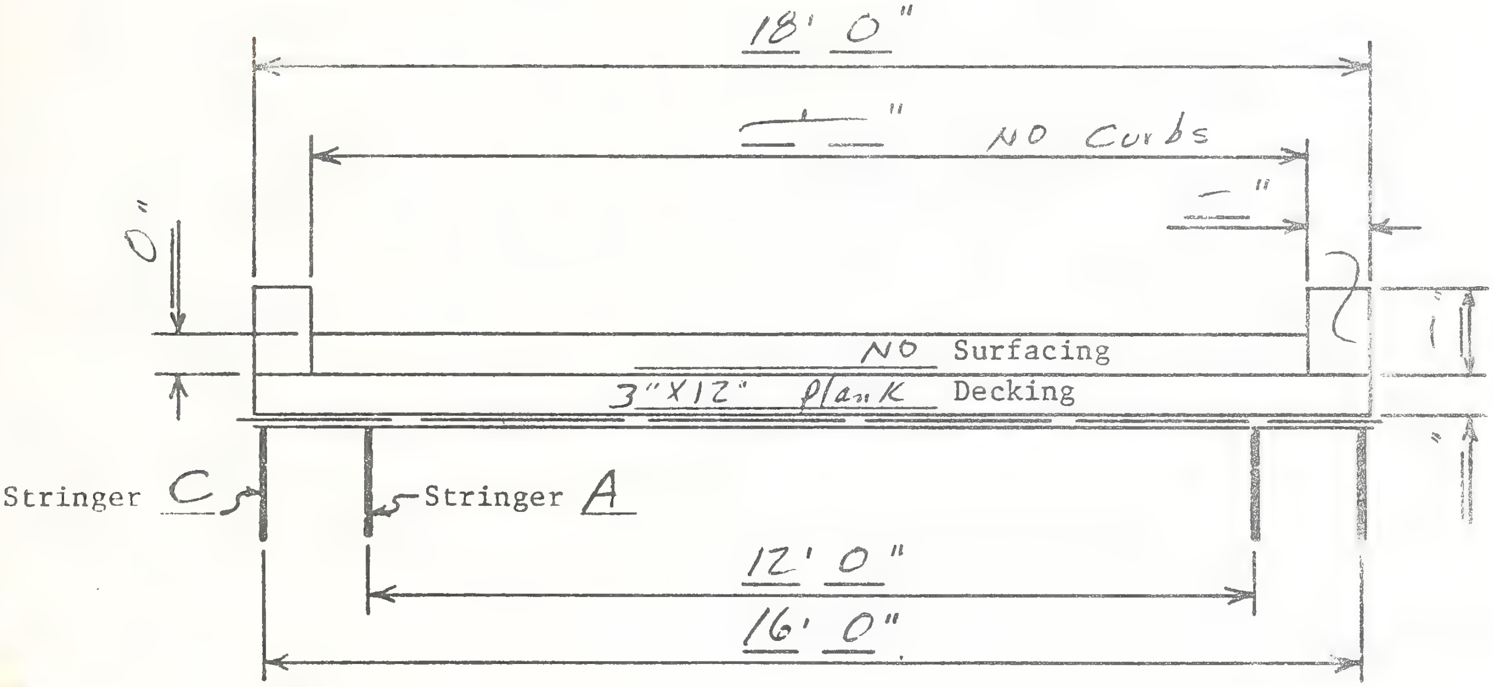
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number ~~142173 [illegible] 6.310~~ 242513-5.6 Span(s) Truss

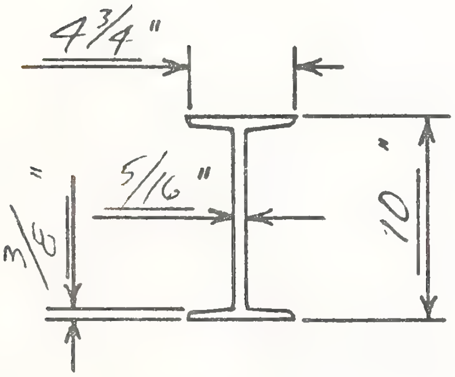
Inspector K.G.

Date 7-27 79

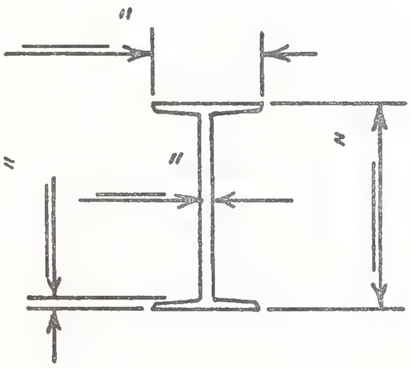


11 Stringers (total)

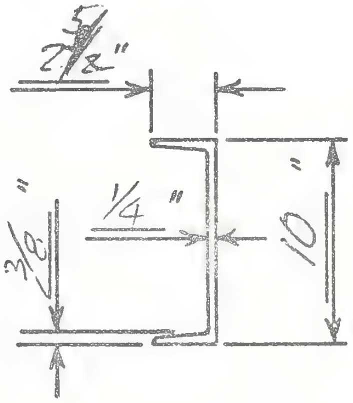
Span Length 52' 0"



STRINGER "A"



STRINGER "B"

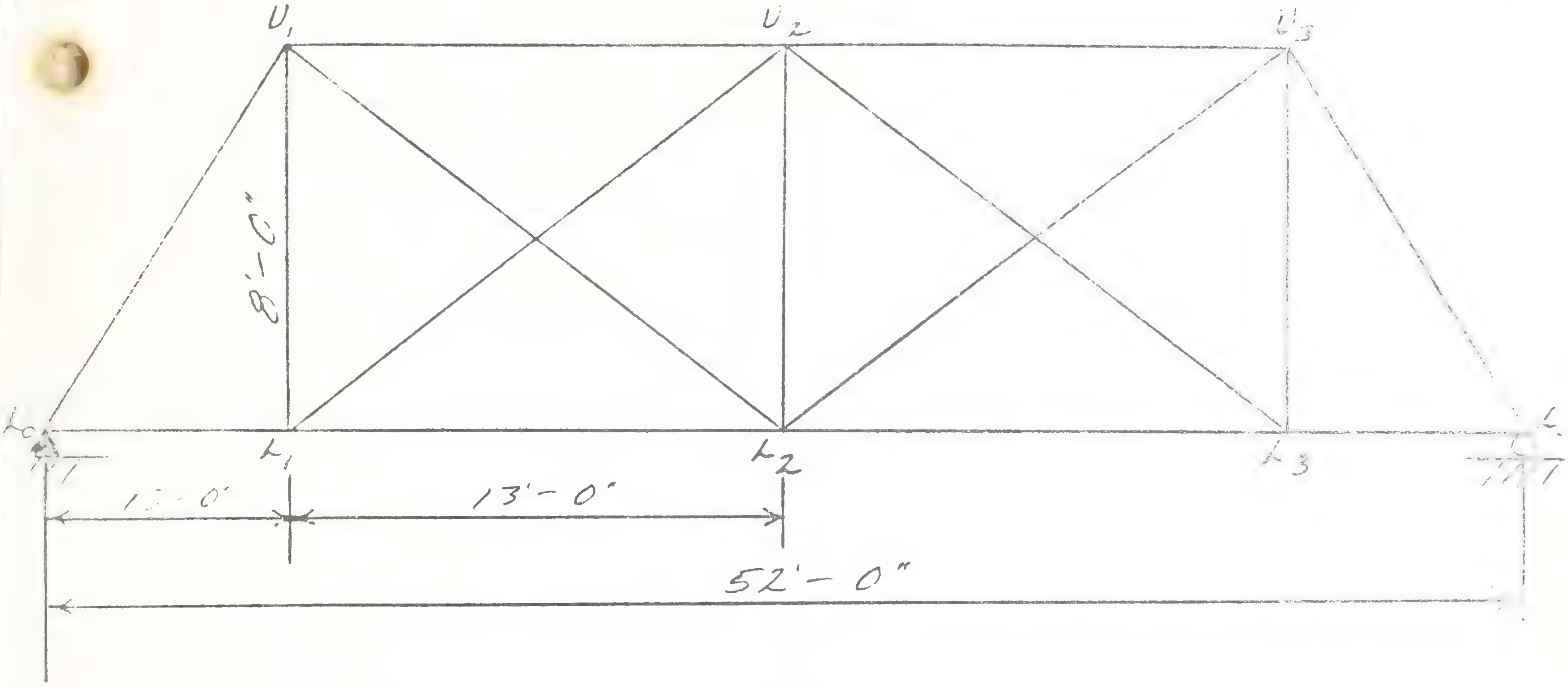


STRINGER "C"

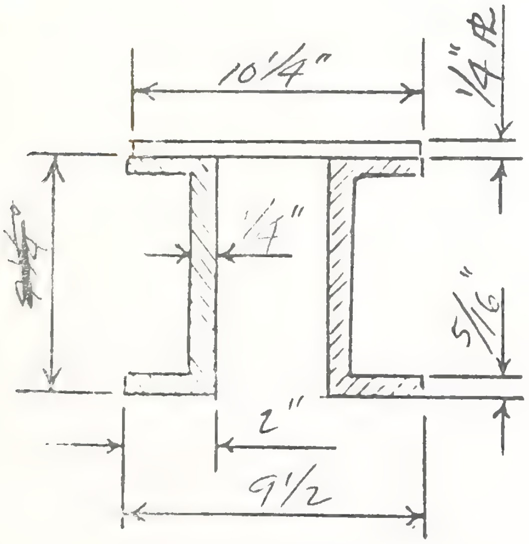
Comments: Stringers are in Fair Condition.

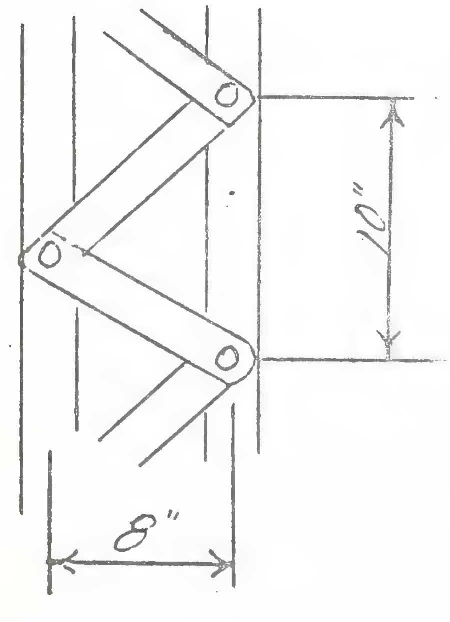
L ~~[illegible]~~ IC (USRS Main Canal) Quale & Kautman [illegible]

Str. Measurements: L42513-5.6 sheet 1 of [illegible]



From center of upstream truss to center of downstream truss = 19'-0"





($L_0 U_1$; $U_1 U_2$; $U_2 U_3$; $U_3 L_4$): 1/4"x1 3/4" strapping

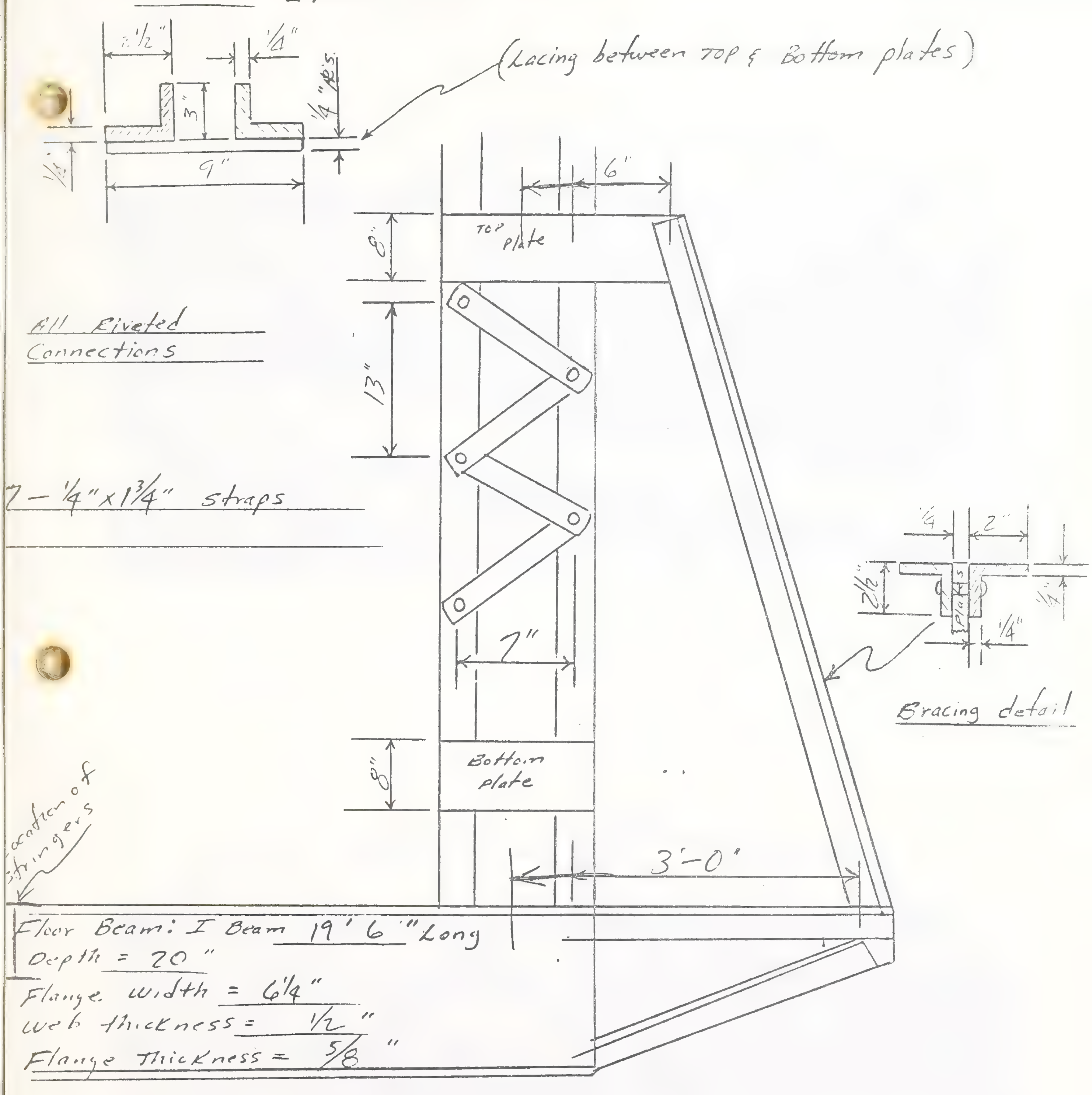
End posts & upper chord. ~ (Bottom side)

[illegible] chord~ 2-eyebars 3/4" x 2 1/2".

Diagonal Members: ($U_1 L_2$; $L_2 U_3$): 2-eyebars 1/2" x 2"

($L_1 U_2$; $U_2 L_3$): one 1" 1 1/8" (Dia) Rod

TOP VIEW L42513-5.6

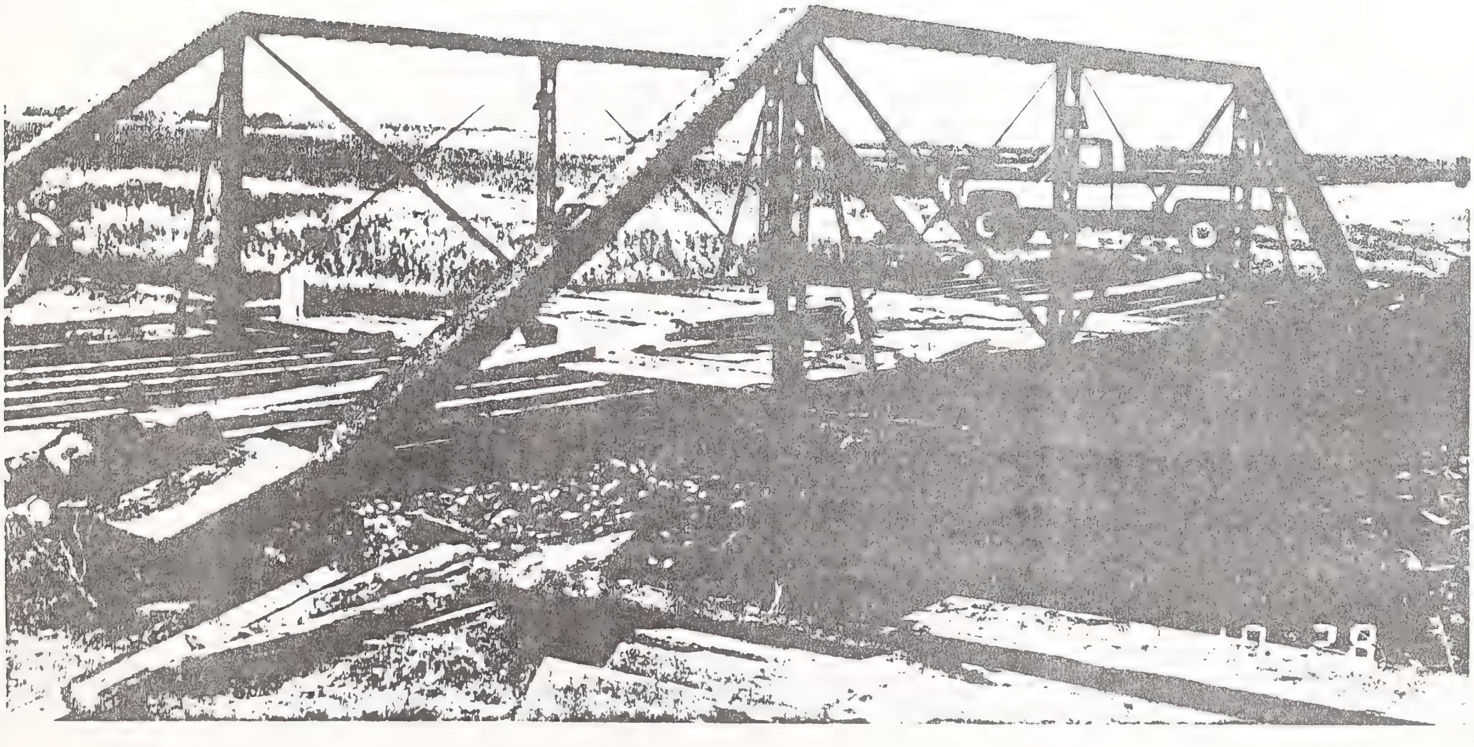


All Riveted Connections

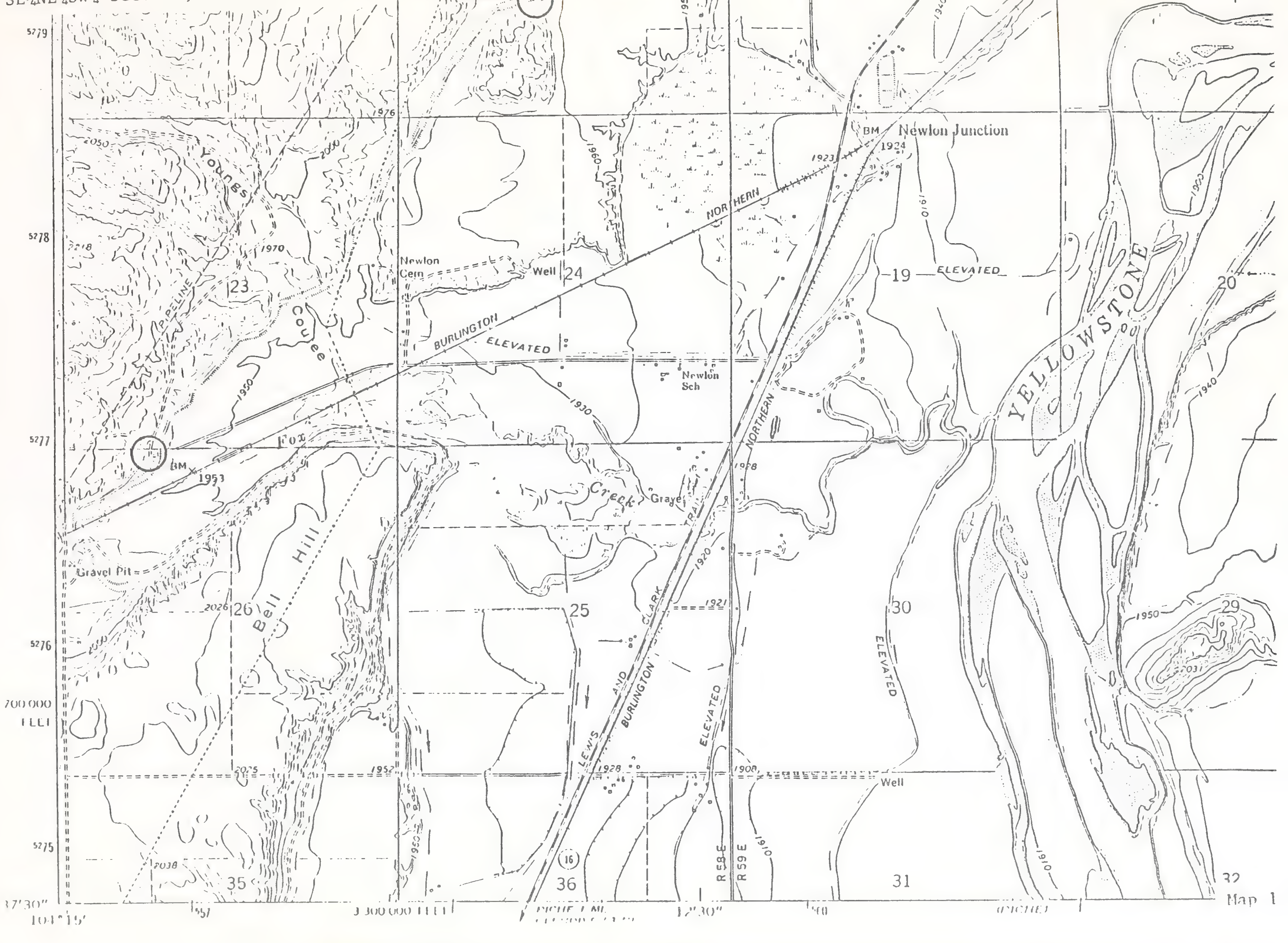
7 - 1/4" x 1 3/4" straps

Floor Beam: I Beam 19' 6" Long
Depth = 20"
Flange width = 6 1/4"
web thickness = 1/2"
Flange Thickness = 5/8"

Vertical Members & outside Bracing.
($U_1 L_1$; $U_2 L_2$; $U_3 L_3$)


13-28

513-3.6
4-C Zone 13 558660E 5279110N
Sidney, Mont. 1:24000 Contour 10'
SE¼NE¼SW¼ Sec. 13, T. 22 N., R. 58 E.



Map 1

MONTANA BRIDGE INVENTORY FORM

Site Number: 24RL 172 Site Name: USRS Canal Bridge, 3 Mi. S.W. Sidney
Structure Number: L42 513 001+0.000-1 003-C Year Built: 1908
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: NW Corner, Sec. 18 T. 22 N., R. 59 E.
UTM Zone: 13, 559605 E. 5280195 N.
Quad Name: Sidney, Mont. Scale: 1:24,000
County/City: Richland Route 513 Mile Crossing Main Canal

OWNERSHIP: MDOH ___ County/City X Federal ___ Private ___ Tribal ___
Specify Richland

PRESENT USE: USRS Canal Bridge
BASIC BRIDGE (check as appropriate)

- ___ Beam, Slab, Girder
- ___ Suspension
- ___ Arch
- ___ Movable
- X Truss
  - X Pin connected
  - ___ Rigid

MATERIALS

- ___ Wood
- X Metal
- ___ Combination
- ___ Stone
- ___ Reinforced Concrete
- ___ Prestressed Concrete

TYPE

- ___ Deck
- X Pony
- ___ Through
- ___ Combination

TRUSS DESIGN

- ___ King Post
- ___ Queen Post
- ___ Howe
- X Pratt
  - ___ Double Intersection
  - ___ Half Hip
  - ___ Parker
  - ___ Camelback
  - ___ Pennsylvania (Petit)
    - ___ Sub Struts
    - ___ Sub Ties
  - ___ Baltimore
- ___ Lenticular
- ___ Warren
  - ___ Verticles
  - ___ Polygonal Chord
  - ___ Double Intersecting
  - ___ Quadrangular
- ___ K
- ___ Other

Length 52' Width 17' No. spans 1 No. panels 4
Abutments concrete No. Piers 0 Type
Designer/Engineer U.S. Reclamation Services, A.P. Davis, Chief Engineer
Fabricator Carnegie Steel
Builder/Contractor A.Y. Bayne and Co., Minneapolis, MN

PHOTOGRAPHIC RECORD

Roll 1, Frames 19 and 20

NARRATIVE DESCRIPTION

A.Y. Bayne and Company of Minneapolis built this 52' light truss with 4 panels 13' in length each and 7' high. It is single span pin-connected Pratt Pony truss. The pins are 2¼". The bottom chord is of forged steel eyebars, while the inclined end posts and top chord is of continuous steel plate riveted to 2 channel sections. Lacing bars are riveted to the bottom flanges. The verticals are four angle sections riveted together with lattice bars. Double angle knee braces are riveted to the floor beam, then rise to near the top of the vertical where they are attached with an 8" plate. The diagonals are eyebars and eyebars with turnbuckles. The 18" guardrail is two angle sections connected by lattice bars. It extends beyond the incline post, where the ends are rather battered from accidents.

NARRATIVE HISTORY

Station 2060 bridge fits the historic record perfectly. Bayne was careful to follow every detail. While the bridge does not rate high in sufficiency, the road deadends on the west side a short distance, so does not receive heavy through traffic. Its isolation may result in its preservation.

INTEGRITY *Good. Its sufficiency was rated as 46.8 in 1986.*

Altered Unaltered *X* Moved *No* Date
Summary of Move:

SIGNIFICANCE

The bridge is significant as one of the USRS Canal bridges built 1907-08. This is a good example of a Bayne 4-panel on this project.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 22, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Canal and road construction have completely altered the landform.*

Was historical/architectural survey conducted around the structure?

Yes X No __

Results negative X

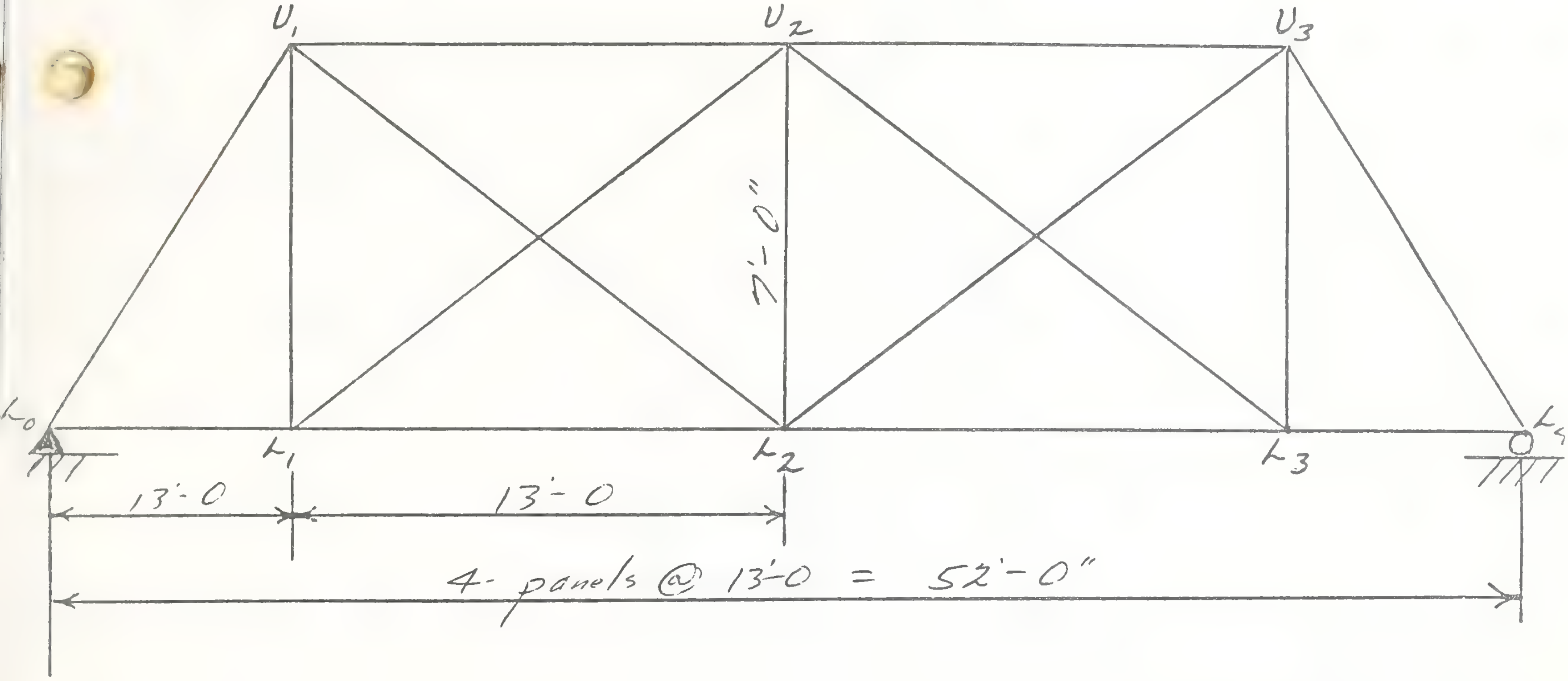
Comments: *No structures nearby except house trailers.*

EV:cm:1/bb

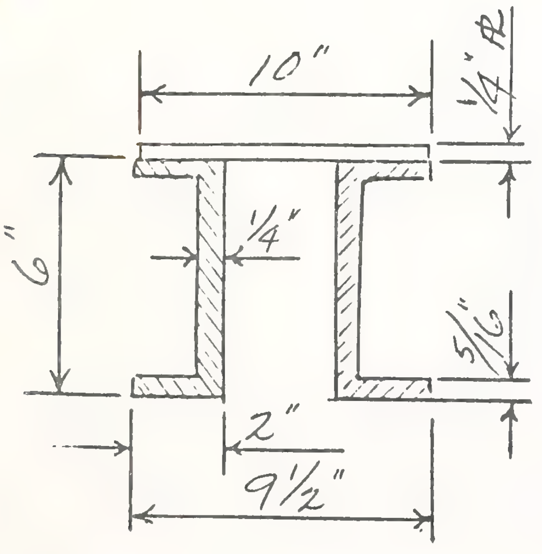
~~[illegible]~~ (USRS Main Canal)

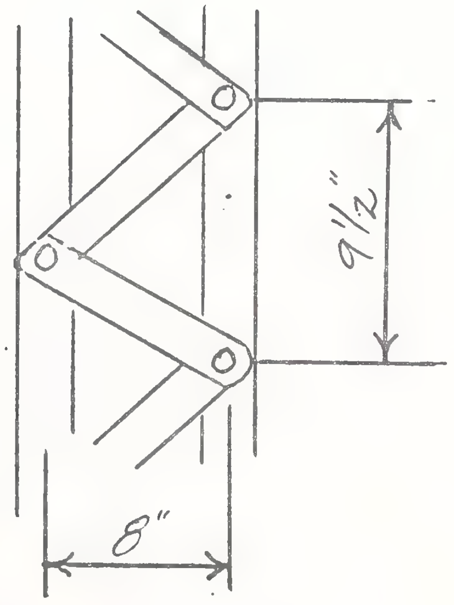
str. Measurements: L42513-1.0

Sheet 1 of 3



From center of upstream truss to center of downstream truss = 19'-0"





($L_0 U_1$; $U_1 U_2$; $U_2 U_3$; $U_3 L_4$): End posts & upper chord. ~ 1/2" X 1 1/2" strapping (Bottom side)

Lower Chord: 2- eye bars 3/4" × 2 1/2".

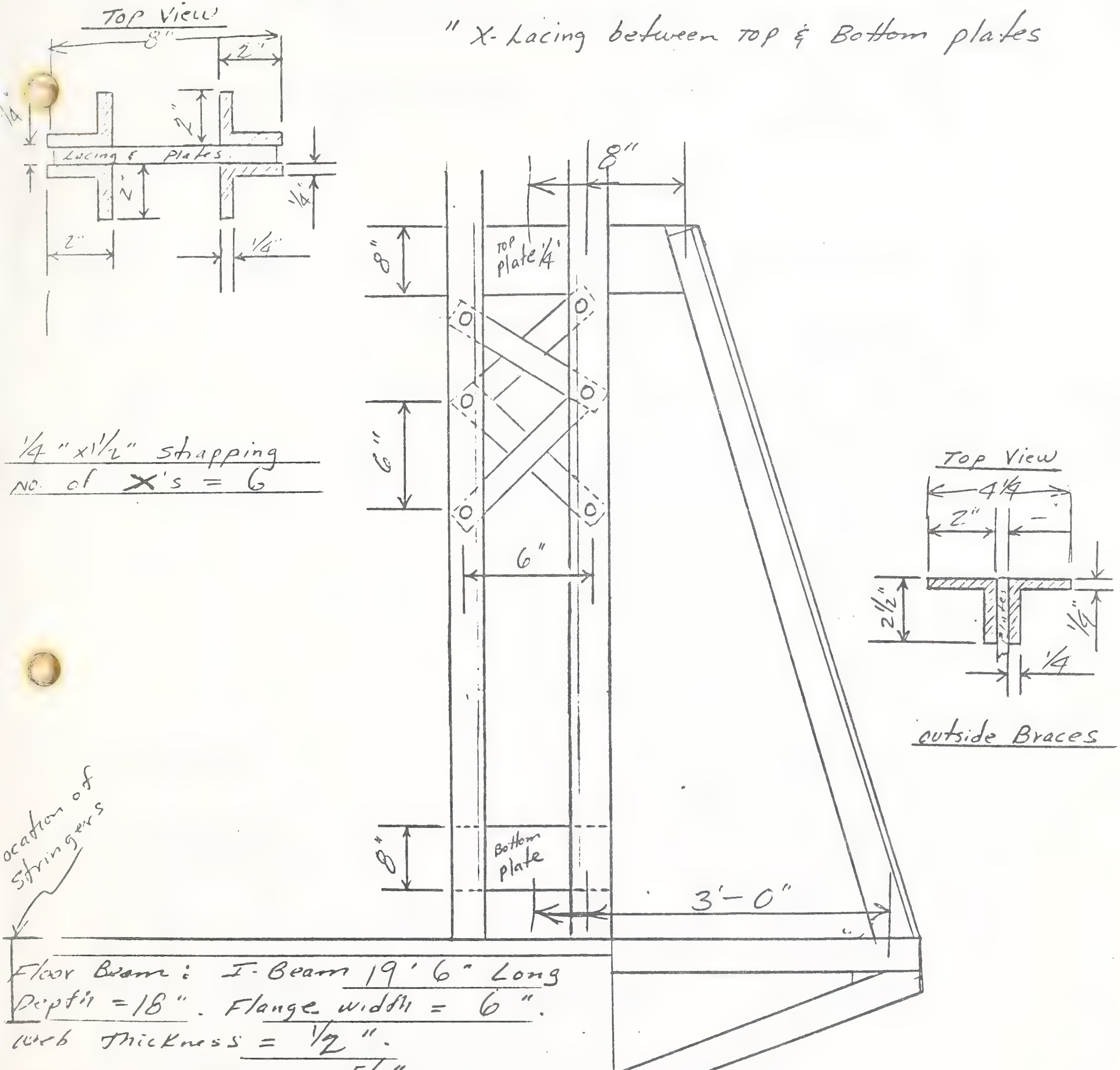
Diagonal Members: ($U_1 L_2$; $L_2 U_3$): 2-eye bars 1/2" × 2".

($L_1 U_2$; $U_2 L_3$): one ~~1~~ 1" ~~dia~~ square Rod

L42513-1.0

sheet 2 of 3

" X-Lacing between Top & Bottom plates



1/4"x1 1/2" strapping
No. of X's = 6

Floor Beam: I-Beam 19' 6" Long
Depth = 18". Flange width = 6".
Web Thickness = 1/2".
Flange Thickness = 5/8".

Vertical Members & outside Bracing
(U_1L_1; U_2L_2; U_3L_3).

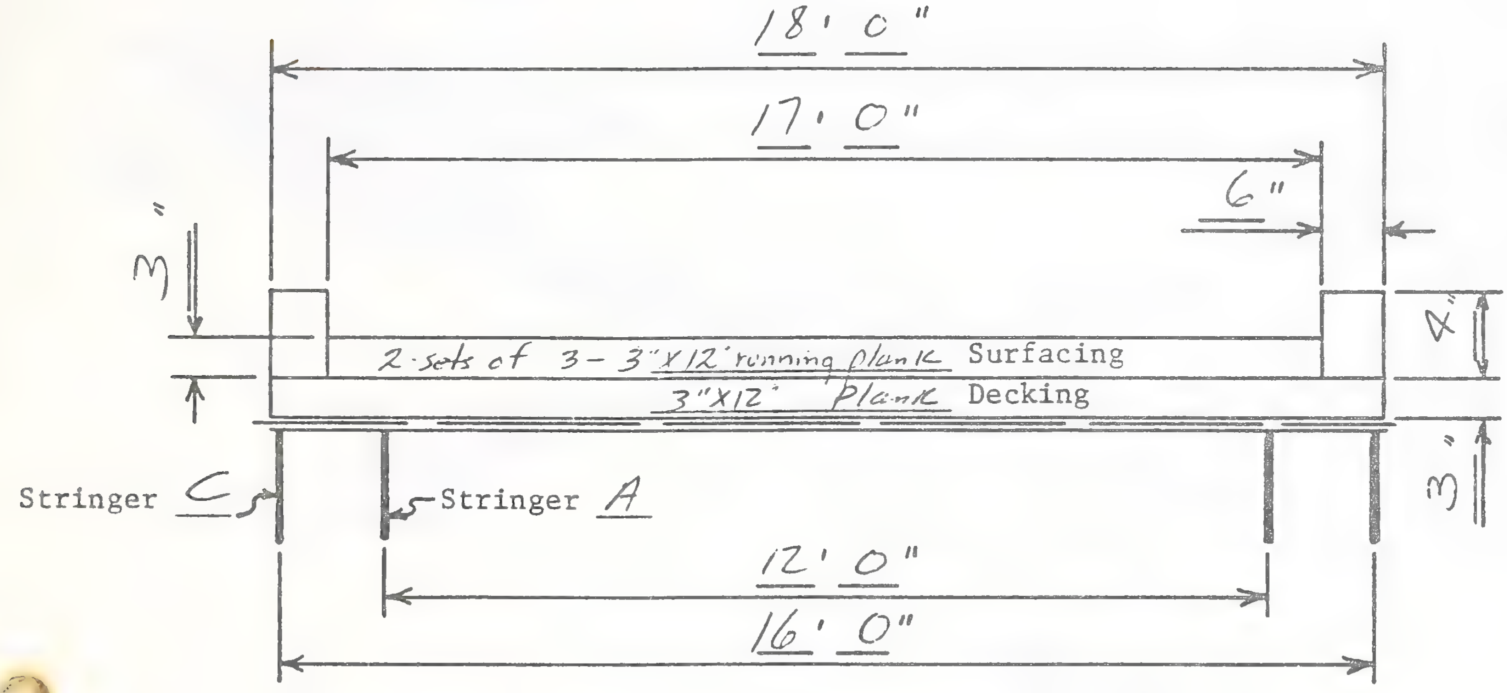
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number ~~L42173 60C10.930~~ L42513 - 1.0 Span(~~s~~) Truss

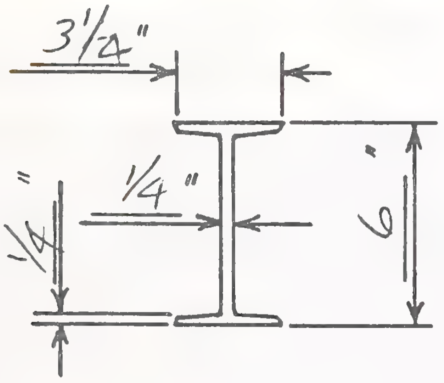
Inspector K.G.

Date 7-25-79

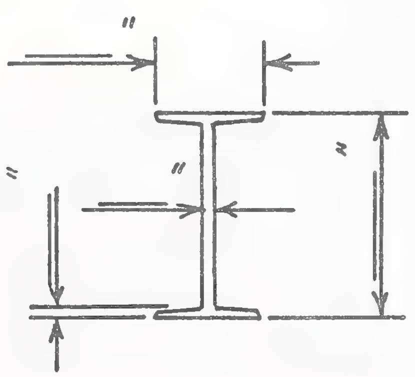


8 Stringers (total)

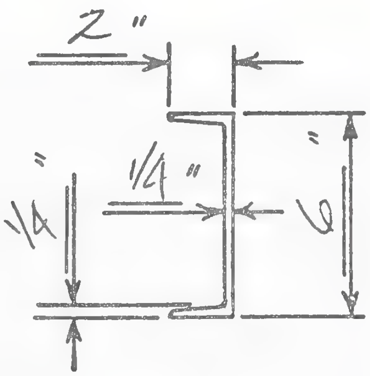
Span Length 52' 0"



STRINGER "A"

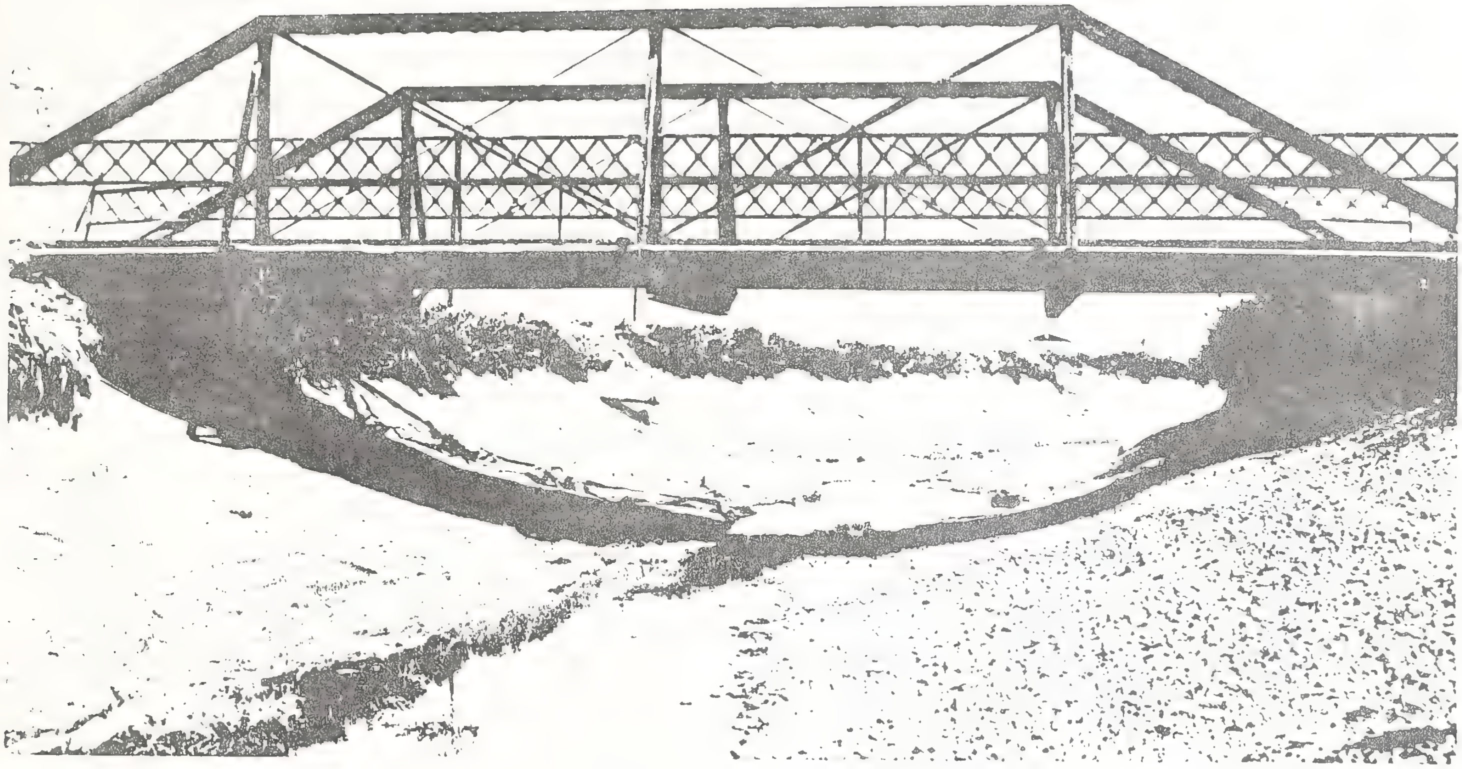


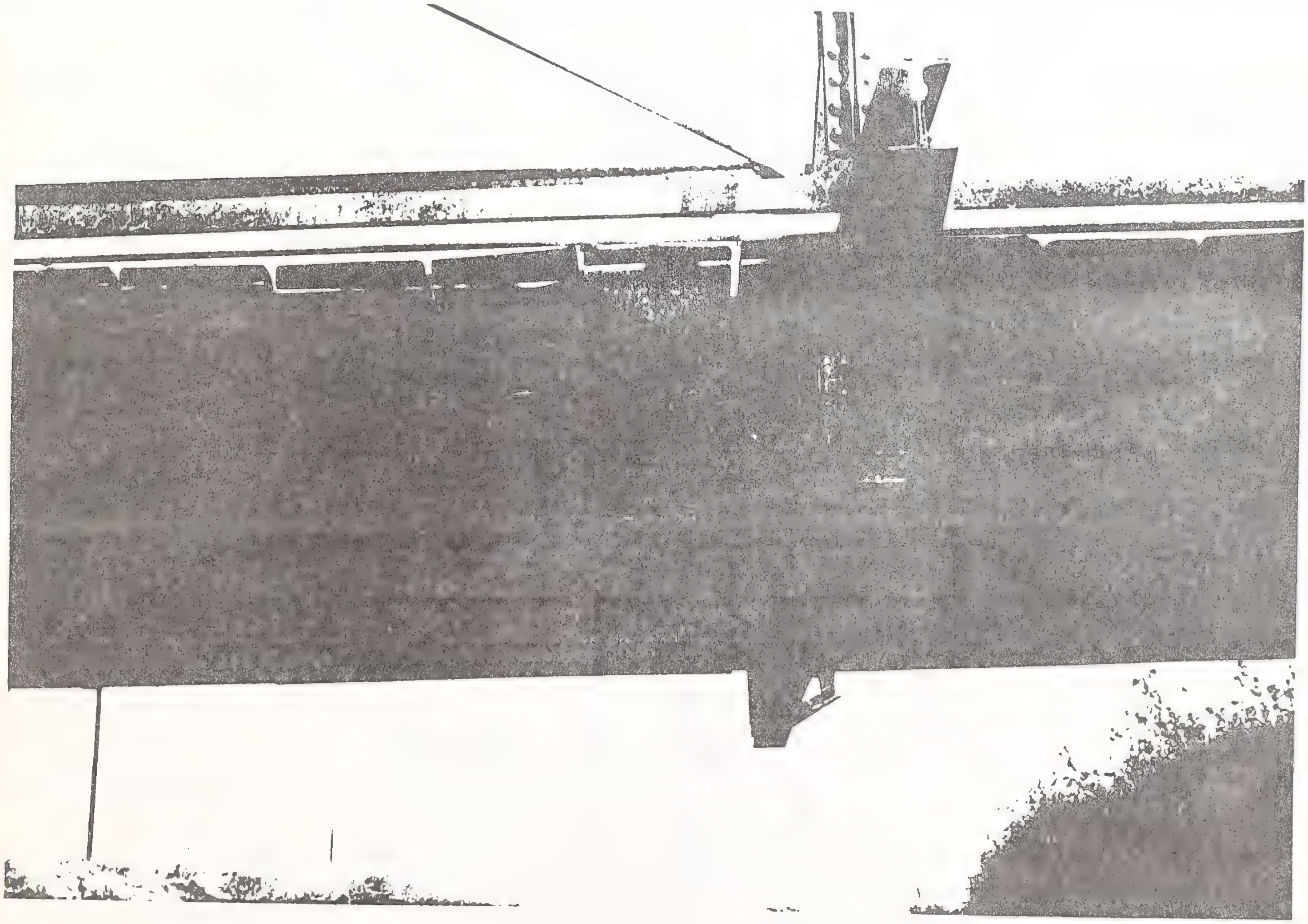
STRINGER "B"



STRINGER "C"

Comments: stringers are in fair condition.



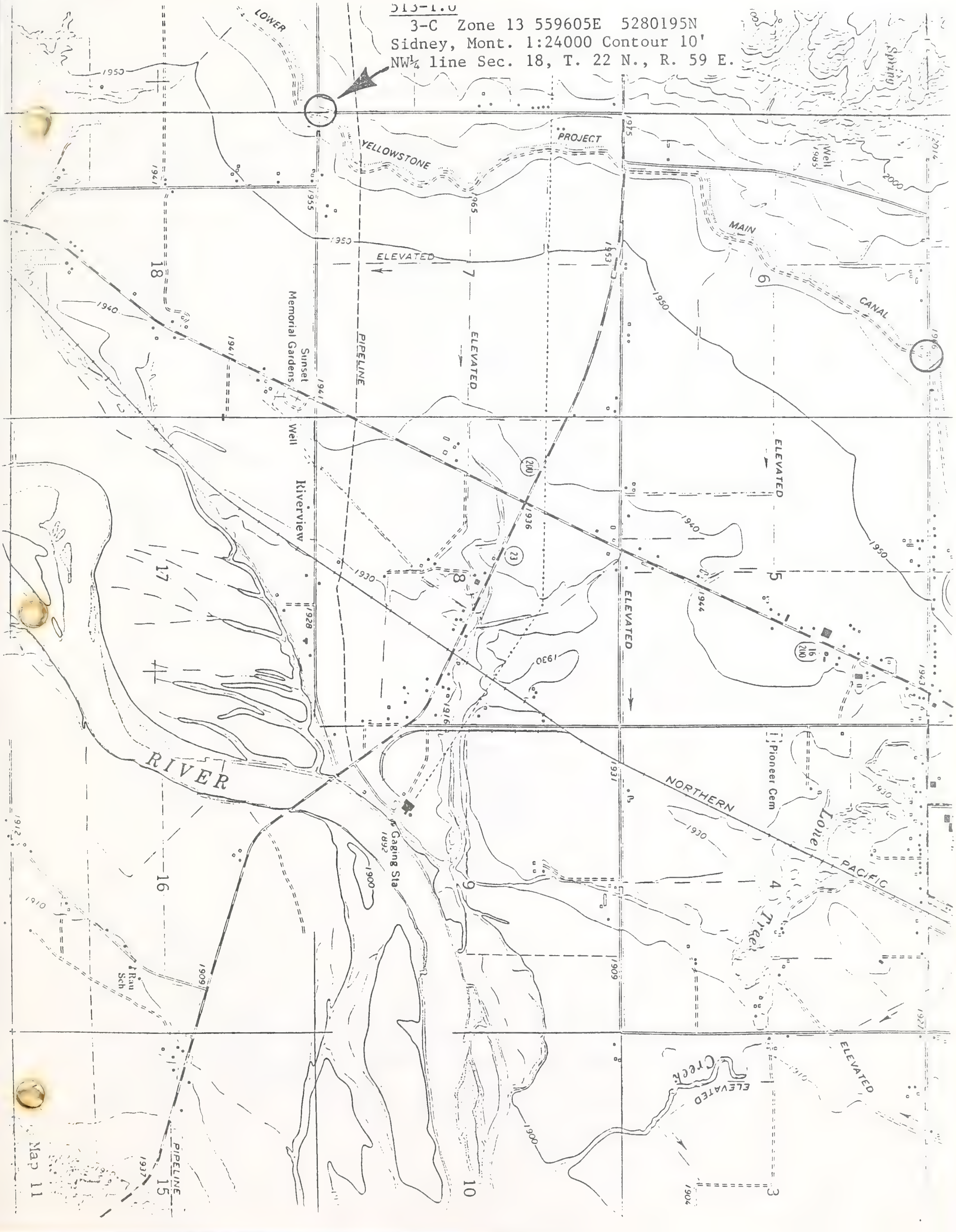


513-1.0

3-C Zone 13 559605E 5280195N

Sidney, Mont. 1:24000 Contour 10'

NW¼ line Sec. 18, T. 22 N., R. 59 E.



MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL173*   Site Name: *USRS Main Canal Bridge, W. Sidney*
Structure Number: *L42 075 001+0.000-1 029-C*   Year Built: *1908*
Evaluation   Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *NW¼NE¼NE¼, Sec. 6 T. 22 N., R. 59 E.*
UTM Zone: *13, 560840 E. 5283440 N.*
Quad Name: *Sidney, Mont.*   Scale: *1:24,000*
County/City: *Richland* Route *075* Mile   Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Richland

PRESENT USE: USRS Main Canal Bridge

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
    X Pin connected
    __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
X Pony
__ Through
__ Combination

TRUSS DESIGN

__ King Post
X Queen Post
__ Howe
__ Pratt
    __ Double Intersection
    __ Half Hip
    __ Parker
    __ Camelback
    __ Pennsylvania (Petit)
        __ Sub Struts
        __ Sub Ties
    __ Baltimore
__ Lenticular
__ Warren
    __ Verticles
    __ Polygonal Chord
    __ Double Intersecting
    __ Quadrangular
    K
__ Other

Length *51'* Width *17.5'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, MN*

PHOTOGRAPHIC RECORD

Roll 1, Frames 16, 17 and 18

NARRATIVE DESCRIPTION

This is a single span, pin-connected Queen Post Pony measuring 51' in length, 17½' wide, and 7' high. Each of the three panels measures 17'. The bottom chord is forged steel eyebars while the top chord is a continuous plate riveted to two channel sections with lacing bars closing at the bottom flanges. The verticals are four-angle sections riveted together with lattice bars. Knee braces of double angles are riveted to the floor beam, then rise to near the top of the verticals where they are riveted in place with 8" plates. The counters or tension members are eyebars or eyebars with turnbuckles. The lattice guardrail is in good shape.

NARRATIVE HISTORY

Station 2197, where this bridge is located, was apparently added to the plans later. The bid schedule calls for a 50' light truss here, but a 51' was necessary to span the canal. All steel trusses less than 52' in length were planned as Queen Posts, and at least one 52' was also a Queen Post, but probably due to error in reading instructions. Sizes were recorded in 2' variables, i.e., 32', 34', 36', 38', etc., except for the steel stringers which were measured to the ¼'.

INTEGRITY *Good. Sufficiency rating for 1986 was 42.6.*

Altered Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

This bridge is significant as a USRS canal bridge, and a good example of the Queen Post as built by Bayne.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 22, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Land is disturbed by canal and road construction.*

Was historical/architectural survey conducted around the structure?

Yes X No __

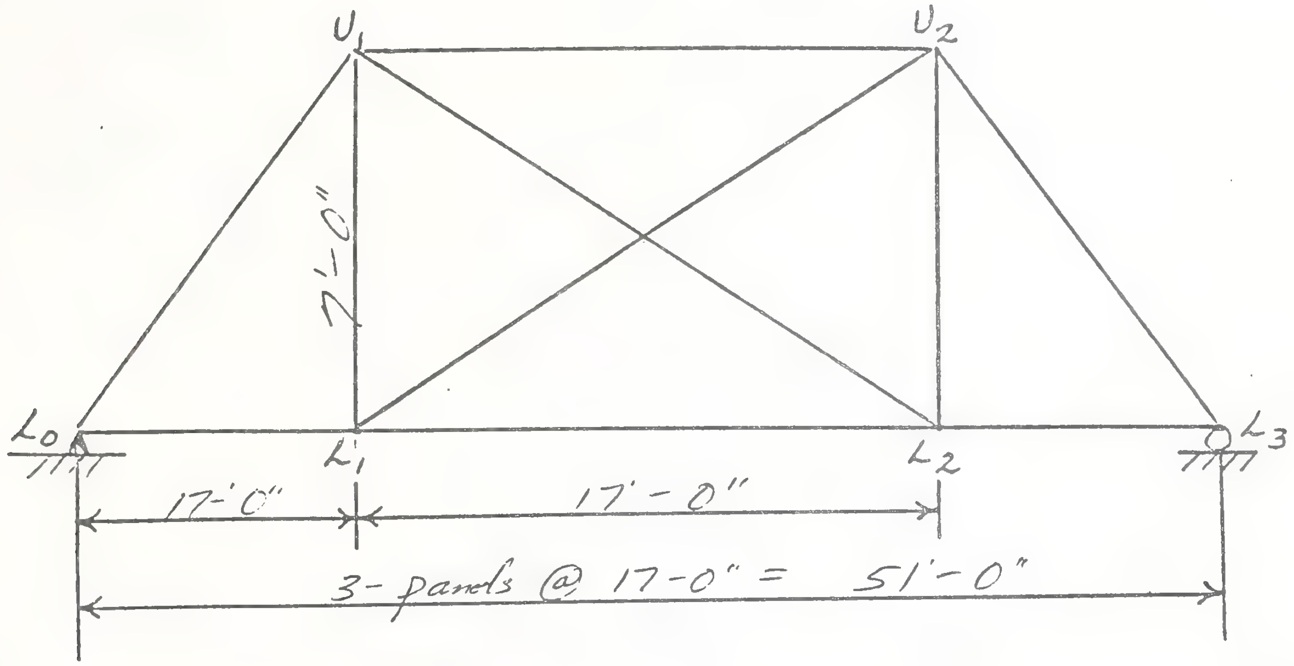
Results negative X

Comments: *A new housing development from Route 16 west approaches the bridge. Since the road ends shortly west of the bridge, it is unlikely development will extend across to the other side. Now the bridge gets only canal traffic, such as ditch riders and maintenance people.*

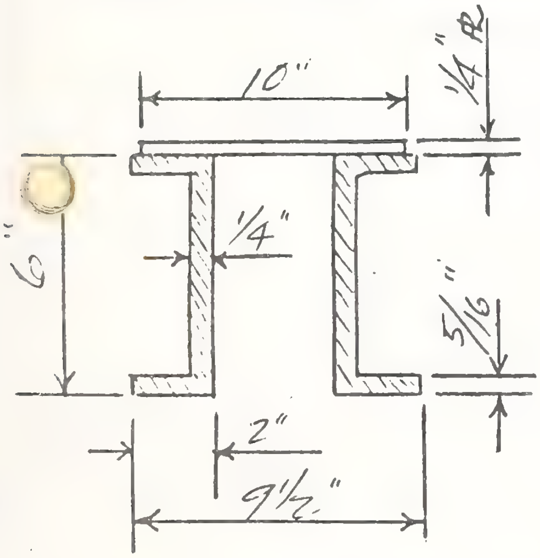
EV:cm:1/dd

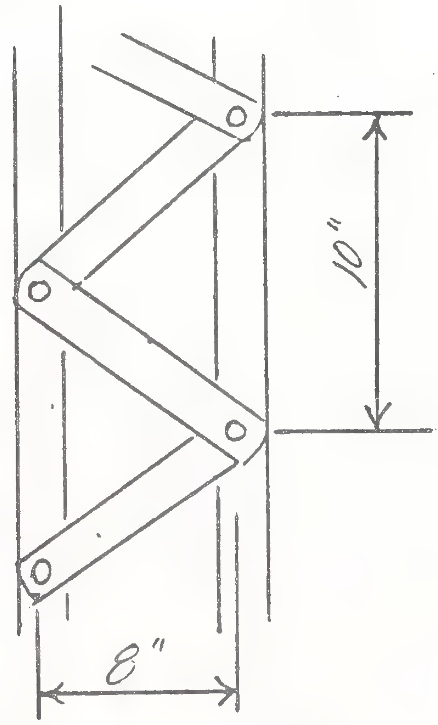
Str. Measurements:

sheet 1 of 3



From Center of upstream Truss to Center of downstream Truss = 19'-0"





End Posts & Top Chord
(L_0U_1; U_1U_2; U_2L_3).

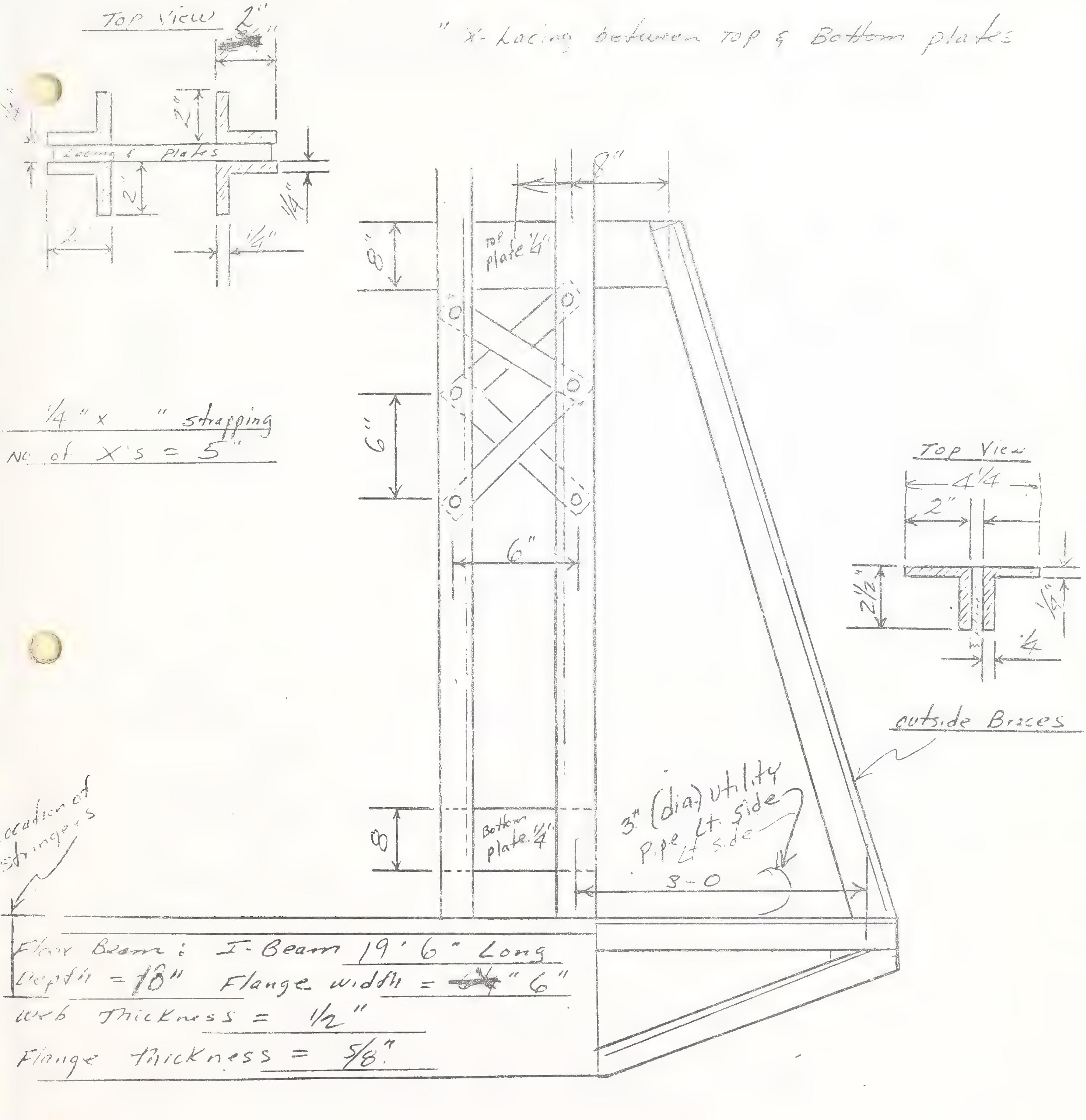
(Bottom side)
1/4" x 1 3/4" strapping

Lower Chord & Diagonals

(L_0L_1; L_1L_2; L_2L_3) 2- eye bars 3/4" x 2 1/2".

(U_1L_2) = one 1" square rod

(U_2L_1) = one 1" " "



1/4" x " strapping

No. of X's = 5"

Floor Beam: I-Beam 19' 6" Long

Depth = 18" Flange width = ~~6 1/4~~" 6"

web Thickness = 1/2"

Flange Thickness = 5/8"

Vertical Members & outside Bracing

($U_1 L_1$; $U_2 L_2$):

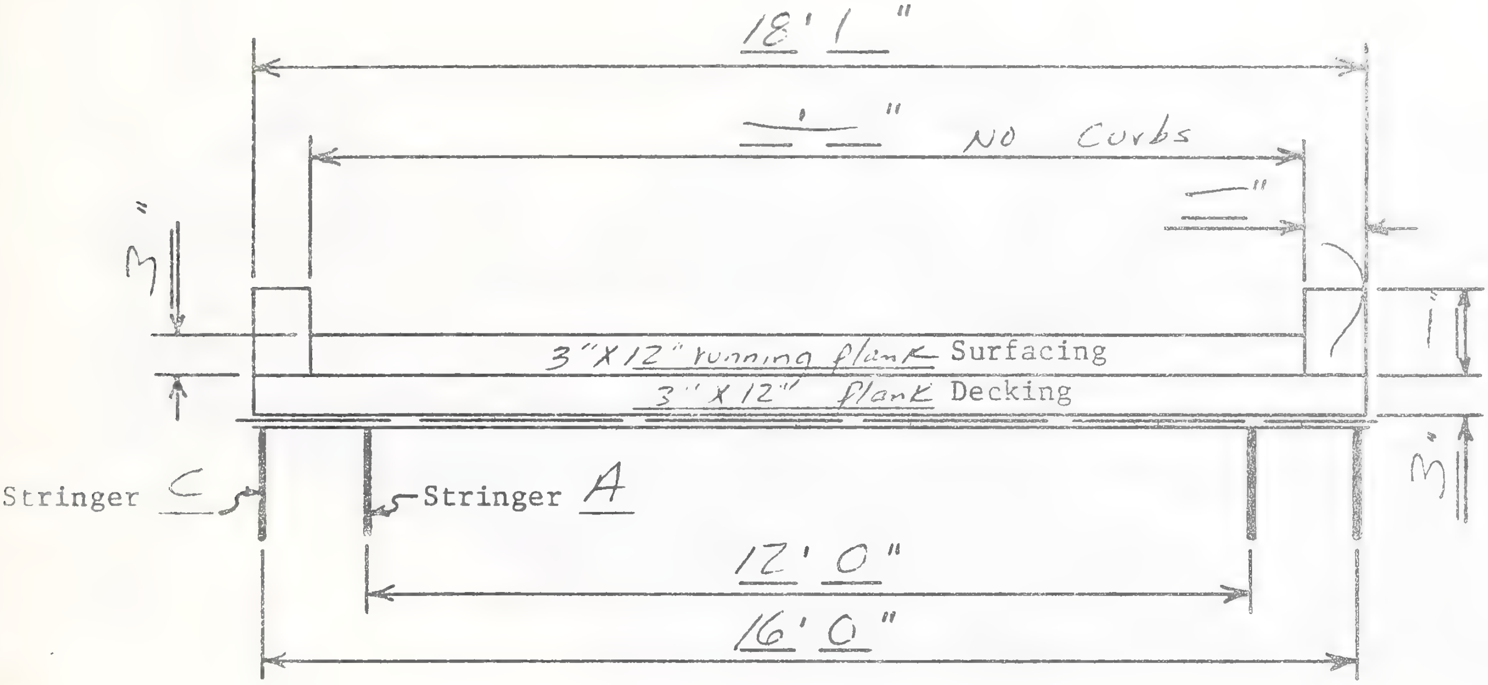
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number ~~L42-331-000-0-330~~ L42075-1.0 Span(s) Truss

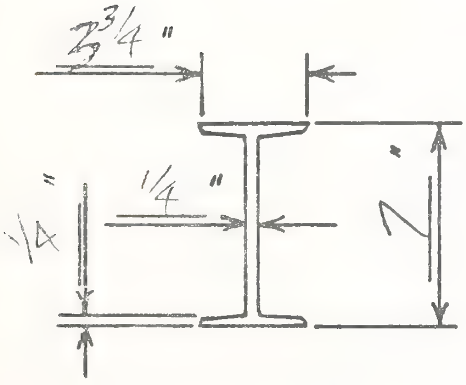
Inspector K.G.

Date 7-25-79

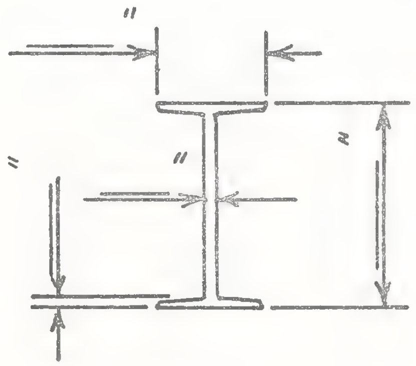


9 Stringers (total)

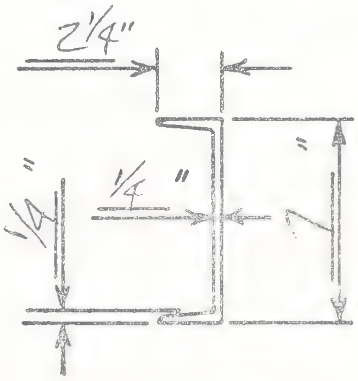
Span Length 51' 0"



STRINGER "A"

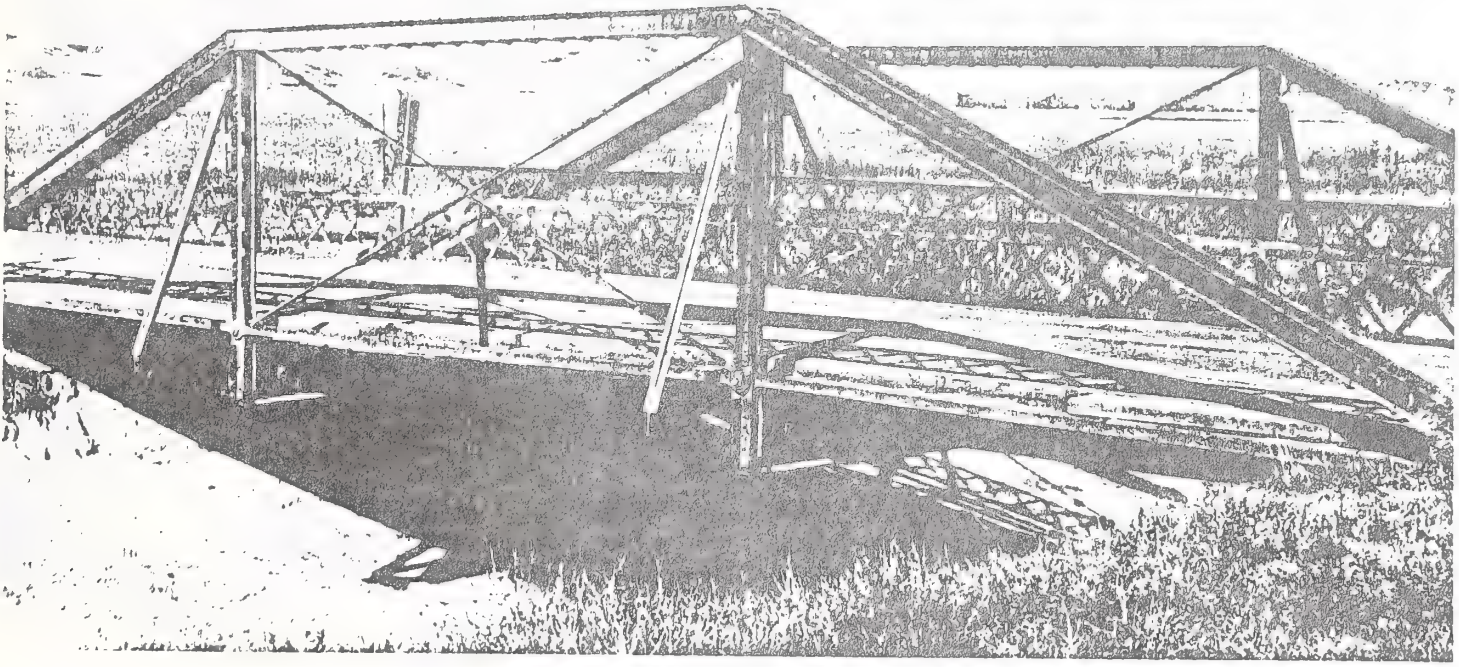


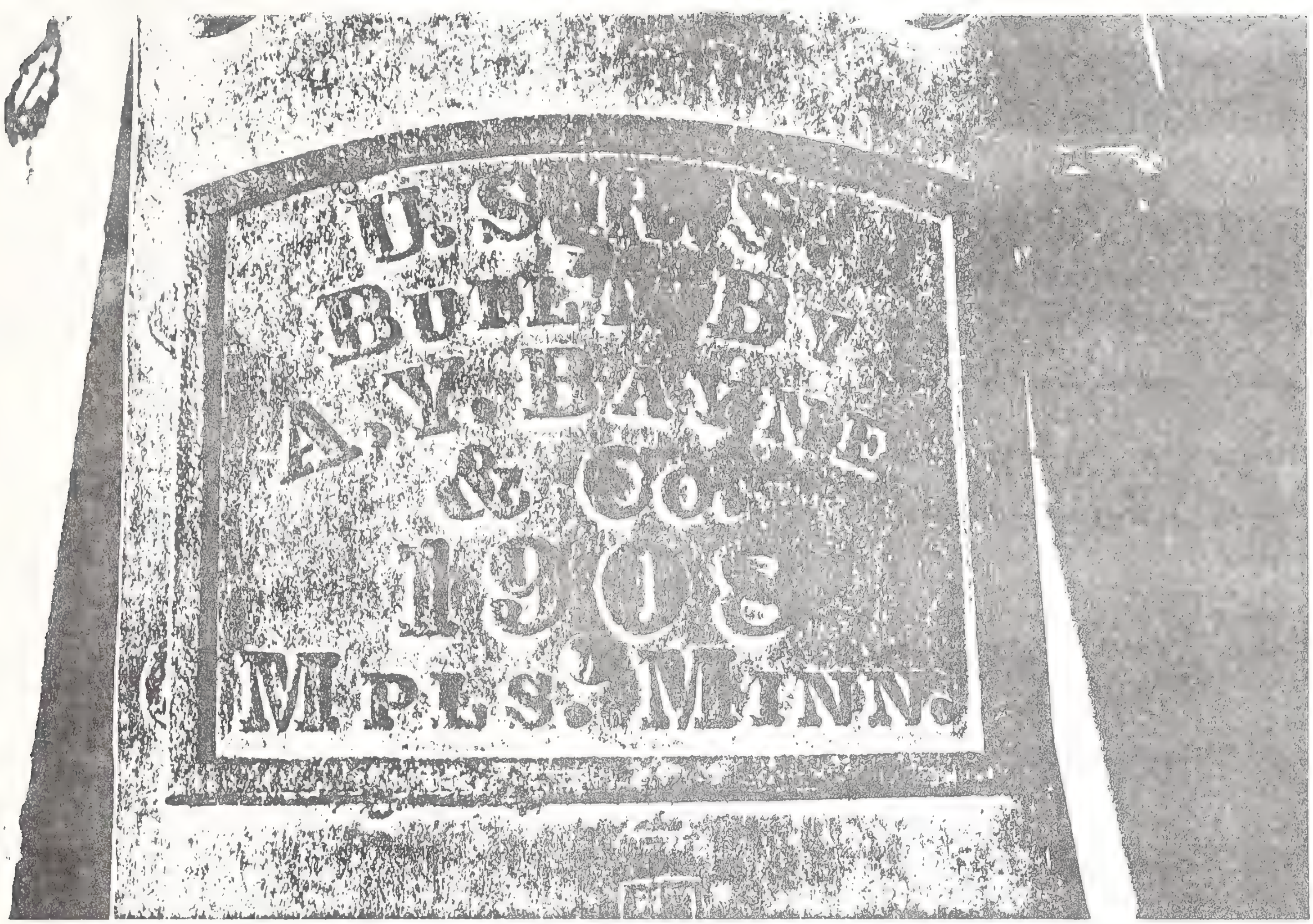
STRINGER "B"

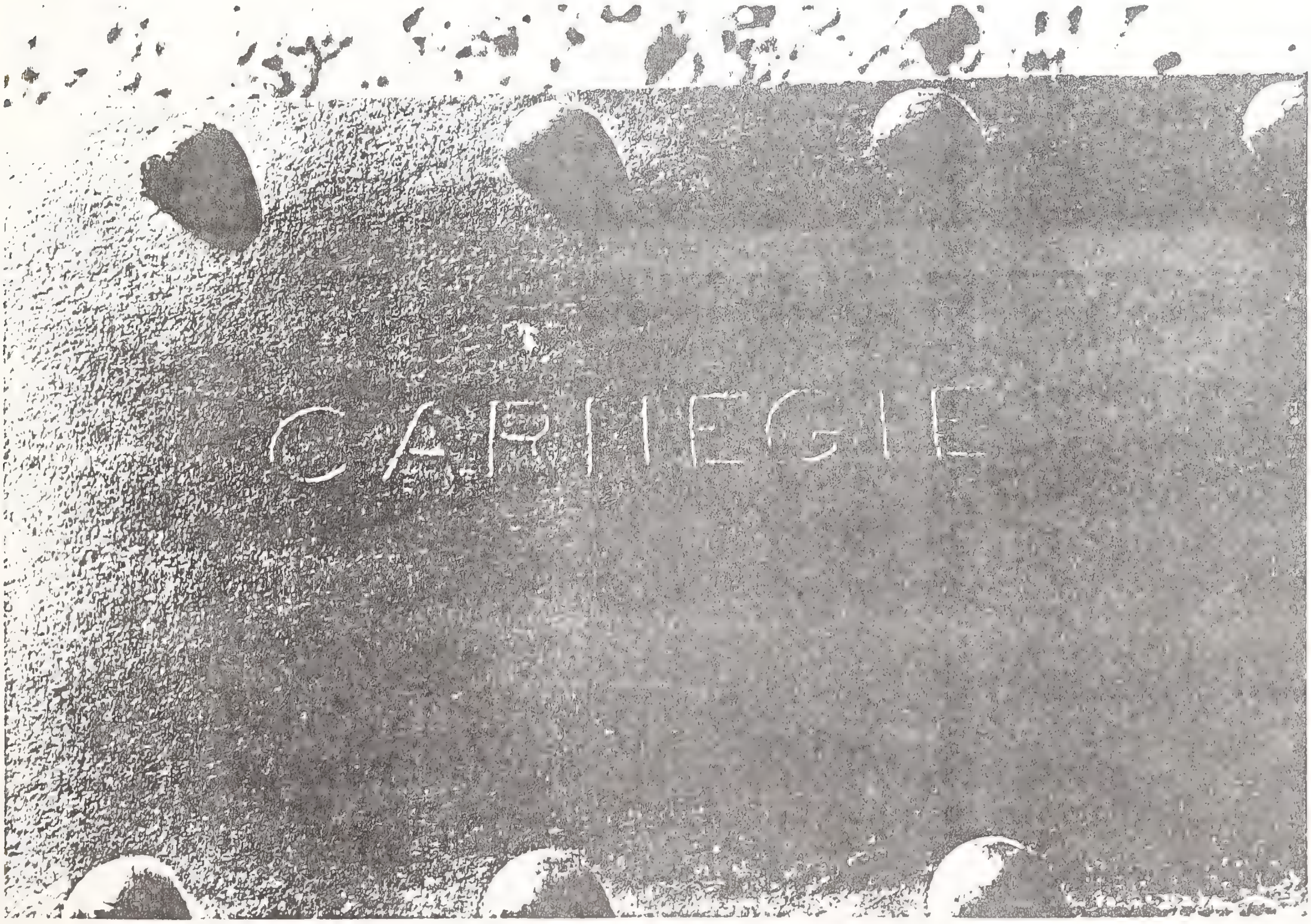


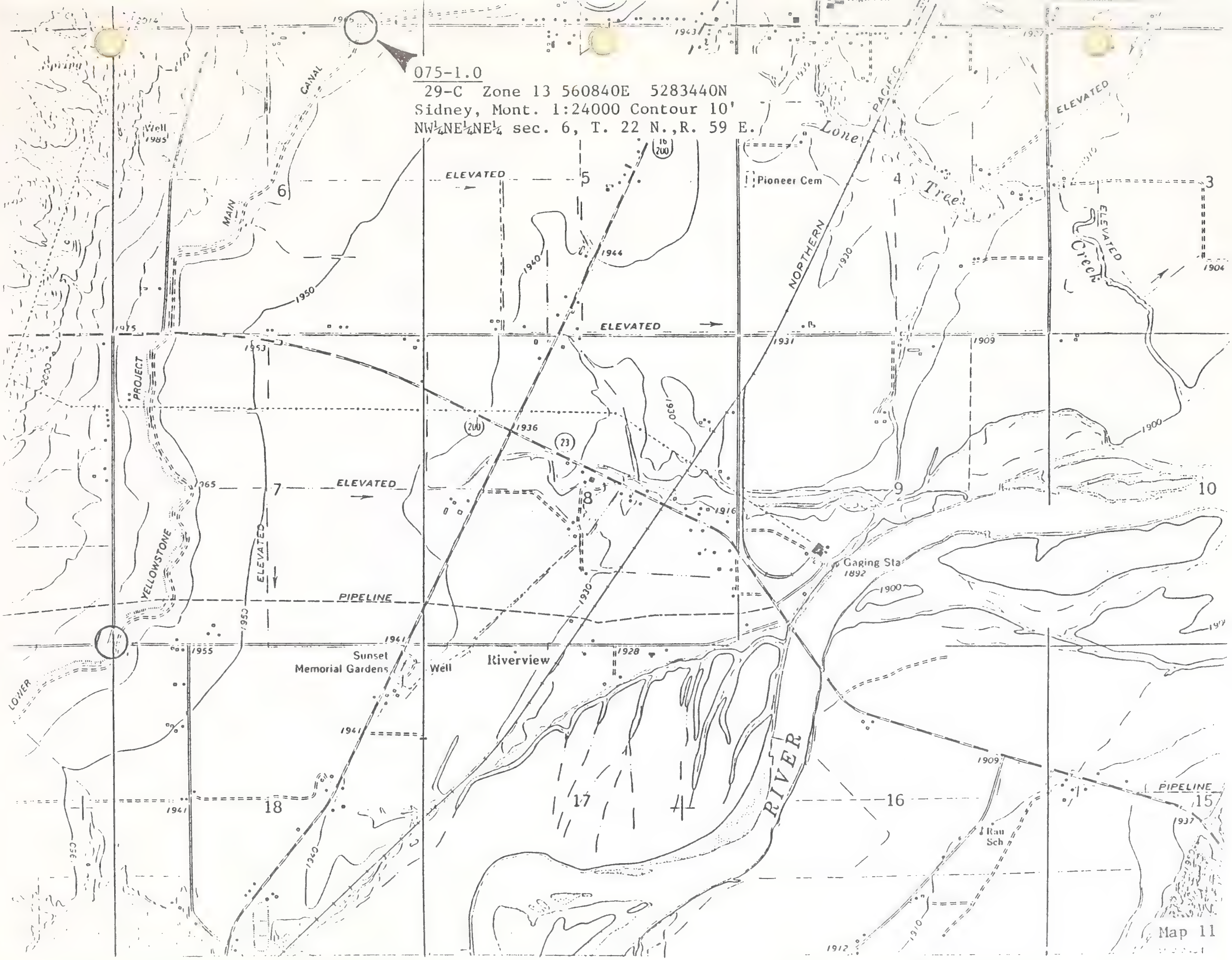
STRINGER "C"

Comments: stringers are in Fair Condition.




U.S.R.S.
BUILT BY
A.Y. BAYNE
& CO.
1908
MPLS. MINN.


CARNEGIE



075-1.0

29-C Zone 13 560840E 5283440N
Sidney, Mont. 1:24000 Contour 10'
NW¼NE¼NE¼ sec. 6, T. 22 N., R. 59 E.

Map 11

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL174* Site Name: *USRS Canal Bridge, 4 Mi. N. Sidney*
Structure Number: *L42 242 000+0.800-1 089-C* Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *NW¼NE¼NE¼, Sec. 16 T. 23 N., R. 59 E.*
UTM Zone: *13, 564185 E. 5289925 N.*
Quad Name: *Fairview S.W., Mont.* Scale: *1:24,000*
County/City: *Richland* Route *242* Mile Crossing *Main Canal*

OWNERSHIP: MDOH ☐ County/City ☒ Federal ☐ Private ☐ Tribal ☐
Specify Richland

PRESENT USE: *USRS Canal Bridge*

BASIC BRIDGE (check as appropriate)

- ☐ Beam, Slab, Girder
- ☐ Suspension
- ☐ Arch
- ☐ Movable
- ☒ Truss
  - ☒ Pin connected
  - ☐ Rigid

MATERIALS

- ☐ Wood
- ☒ Metal
- ☐ Combination
- ☐ Stone
- ☐ Reinforced Concrete
- ☐ Prestressed Concrete

TYPE

- ☐ Deck
- ☒ Pony
- ☐ Through
- ☐ Combination

TRUSS DESIGN

- ☐ King Post
- ☒ Queen Post
- ☐ Howe
- ☐ Pratt
  - ☐ Double Intersection
  - ☐ Half Hip
  - ☐ Parker
  - ☐ Camelback
  - ☐ Pennsylvania (Petit)
    - ☐ Sub Struts
    - ☐ Sub Ties
  - ☐ Baltimore
- ☐ Lenticular
- ☐ Warren
  - ☐ Verticles
  - ☐ Polygonal Chord
  - ☐ Double Intersecting
  - ☐ Quadrangular
  - ☐ K
- ☐ Other

Length *41'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 1, Frames 1, 2, 3, 8, 9, 10, 11, 12

NARRATIVE DESCRIPTION

This 41' single span, pin-connected steel Queen Post Pony truss is 17.7' wide and stands 6' high. The three panels measure 13½' each. The bottom chord is forged steel eyebars, and the incline end posts and top chord are of continuous steel plate riveted to two channel sections and closed on the bottom flanges by lacing bars. The verticals are four-angle sections connected by lattice bars. Double angle knee braces are riveted to the floor beams and rise to near the top of the vertical, where they are connected by an 8" plate. Counters or diagonals are eyebars or eyebars with turnbuckles. The lattice guardrail is bent on the east approach on both sides. The deck is new wood plank, and the stringers were recently replaced.

NARRATIVE HISTORY

This bridge at Station 2476, two just south of here at 2411 and 2342 (neither of which remain), the one immediately north at 2510 and at least ten other bridges further north, were originally proposed to be combination wood and steel. The plans are found in Specifications 136, Drawing 6. By the time contracts were let, however, these locations were scheduled for light steel trusses, and A.Y. Bayne had the contracts for all of them. No combination bridges are found on the canal, and it appears that none were built.

This bridge is on a dirt and gravel road that leads to a residence and a gravel pit on the west side of the canal.

INTEGRITY *Poor. The rating was 17.9 in 1984, and was raised to 45.6 in 1986 after new stringers and deck were added.*

Altered Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

As one of the USRS Canal bridge, it is historically significant. The bent guardrail and abutment scour make it a problem for maintenance.

PROPOSED IMPACTS/RECOMMENDATIONS

The bridge is proposed by the Richland County Commissioners for replacement.

Site Recorded By: *Edrie Vinson* Date: *January 22, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Surface disturbance from canal and road construction precluded possibilities of finding intact archaeological resources.*

Was historical/architectural survey conducted around the structure?

Yes X No __

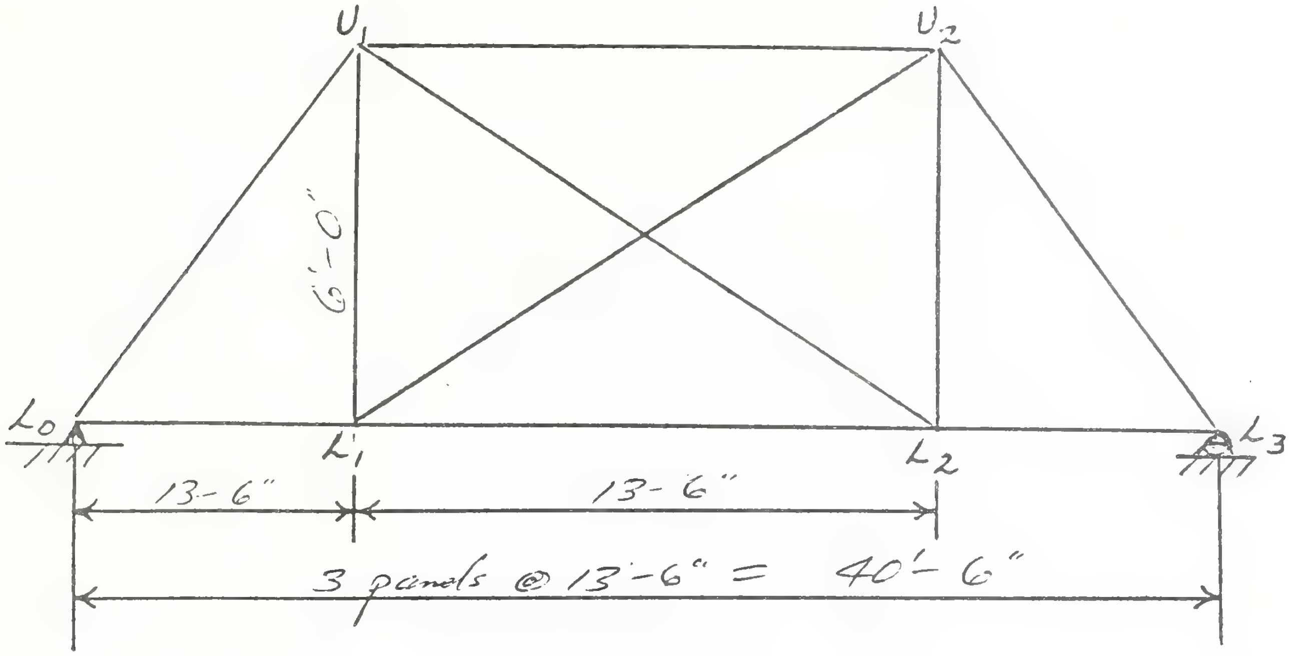
Results negative X

Comments: *Nearest the canal is a trailer on the east bank. Two farmsteads are located on either side of the road to the east, but neither were historically or architecturally important.*

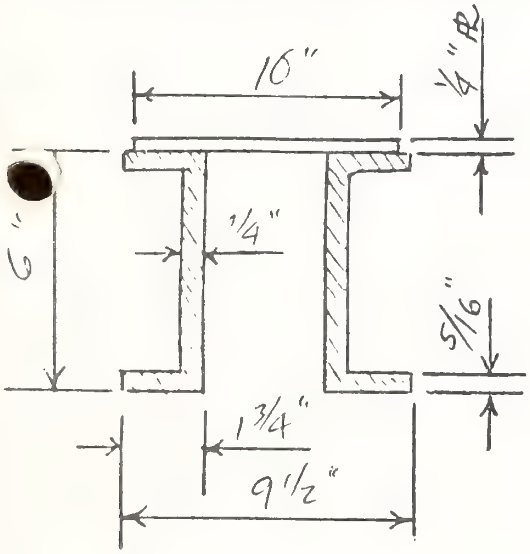
EV:cm:1/ee

[illegible] (USRS Main Canal) [illegible]

Str. Measurements: Sheet 1 of 3

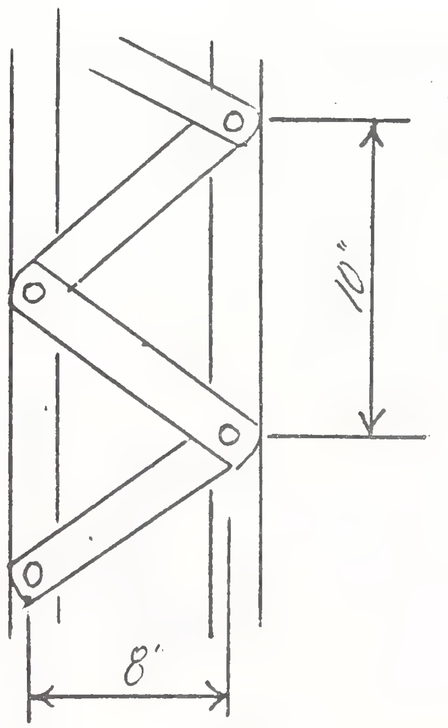


From Center of upstream Truss to Center of downstream Truss = 19'-0"



End Posts & Top Chord

($L_0 U_1$; $U_1 U_2$; $U_2 L_3$).



(Bottom side)

1/4" X 1 3/4" strapping

Lower Chord & Diagonals

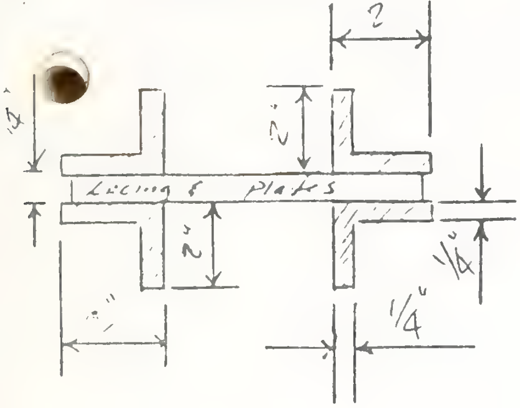
($L_0 L_1$; $L_1 L_2$; $L_2 L_3$) 2- eye bars 3/4" x 2 1/2".

($U_1 L_2$) = one- 1" square Rod

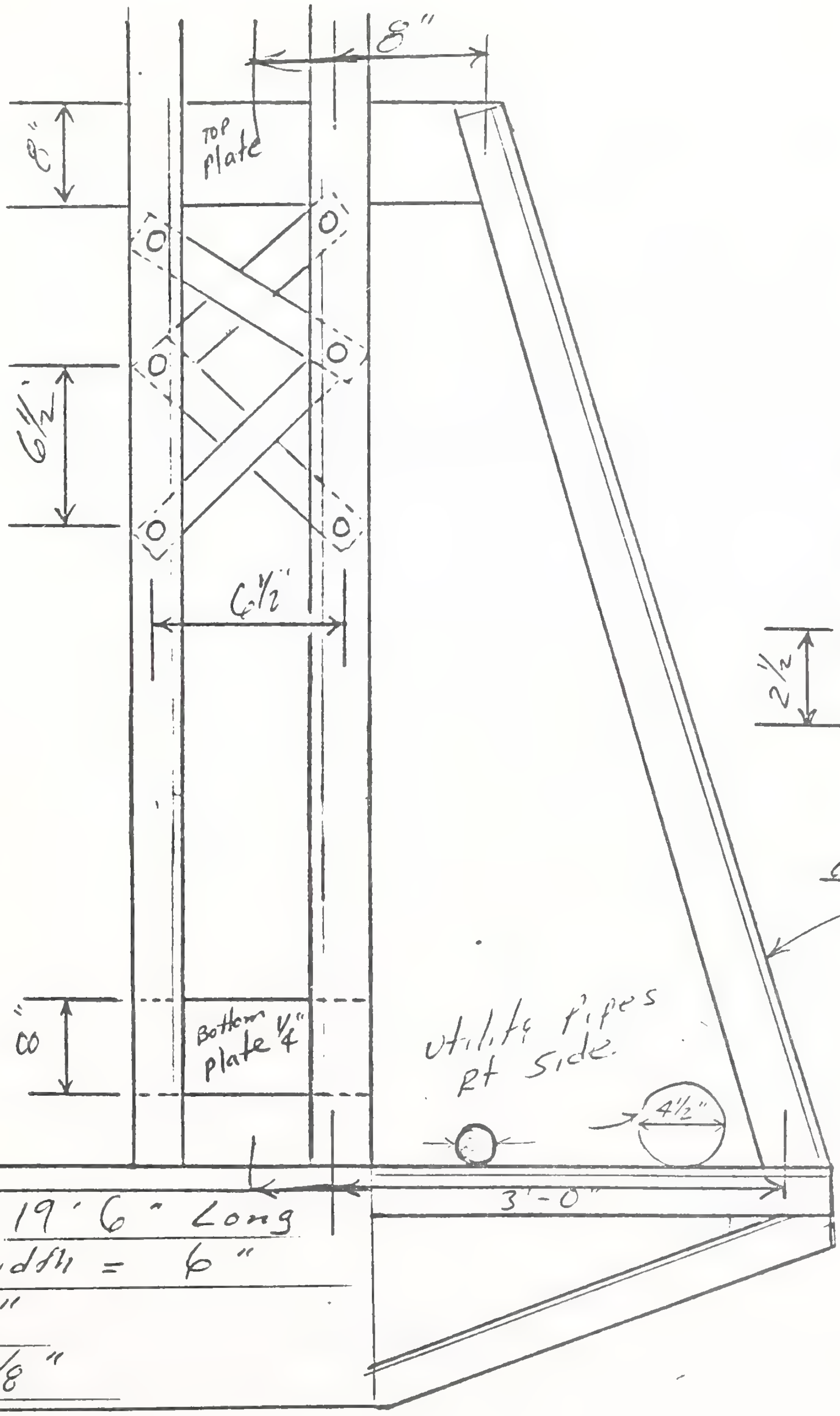
($U_2 L_1$) = one- 1" square Rod

Sheet 2 of 3

TOP VIEW



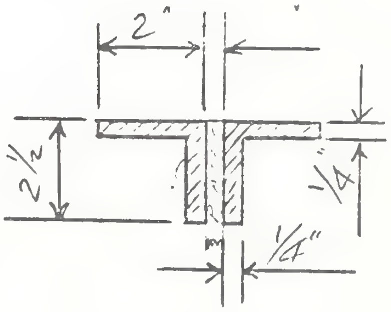
" X-Lacing between Top & Bottom plates



1/4 " x 1 1/2" strapping

No of X's = 4

Top View



outside Braces

Floor Beam: I-Beam 19'6" Long
Depth = 18" Flange width = 6"
web Thickness = 1/2"
Flange thickness = 5/8"

Vertical Members & outside Bracing (U_1 L_1; U_2 L_2):

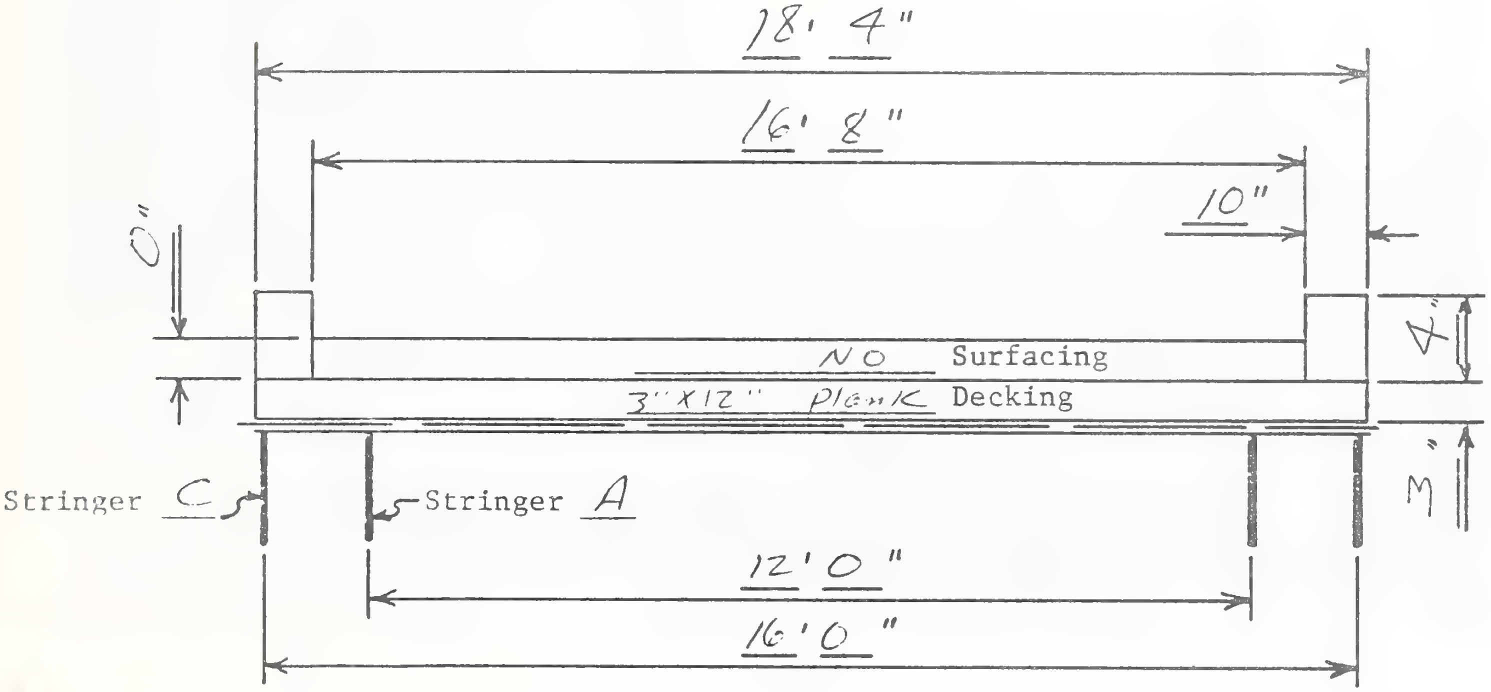
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number L42266 000+0.750 Span(s) Truss

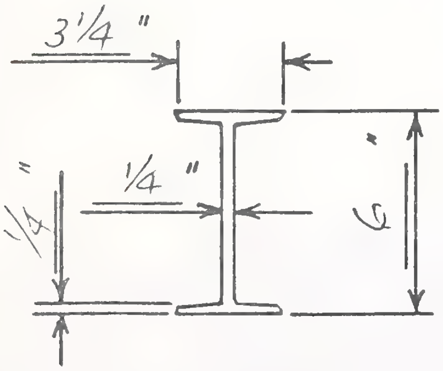
Inspector K.G.

Date 7-25 79



9 Stringers (total)

Span Length 41' 0"



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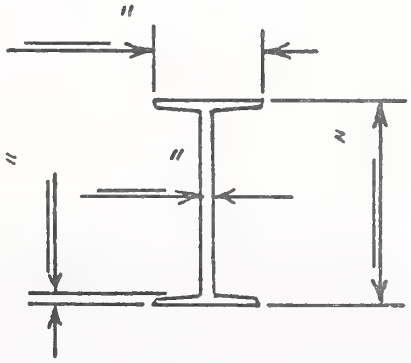
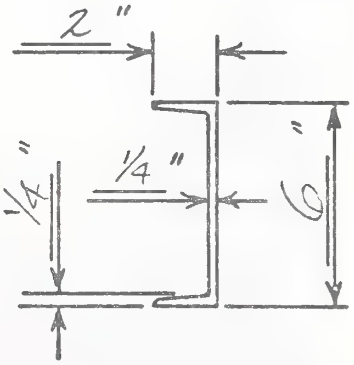
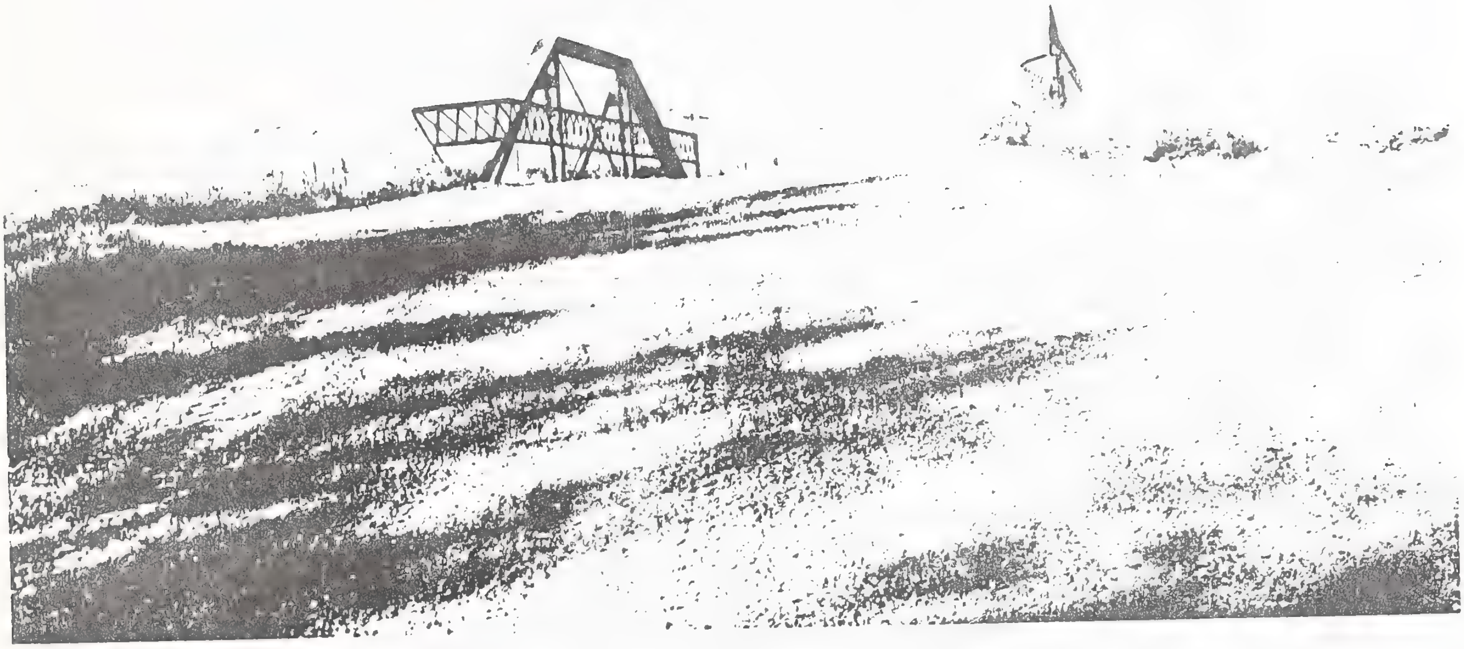


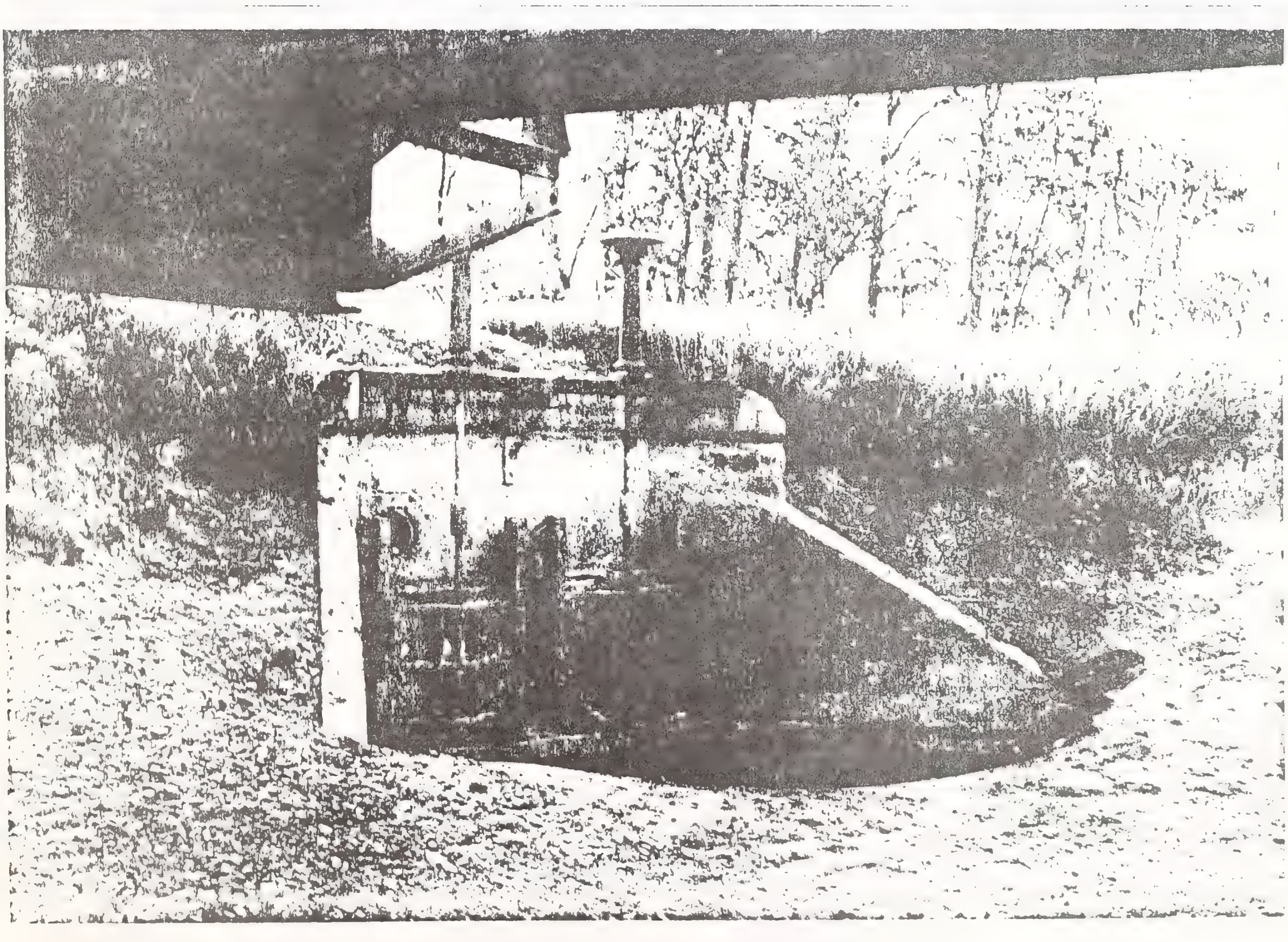
STRINGER "B"

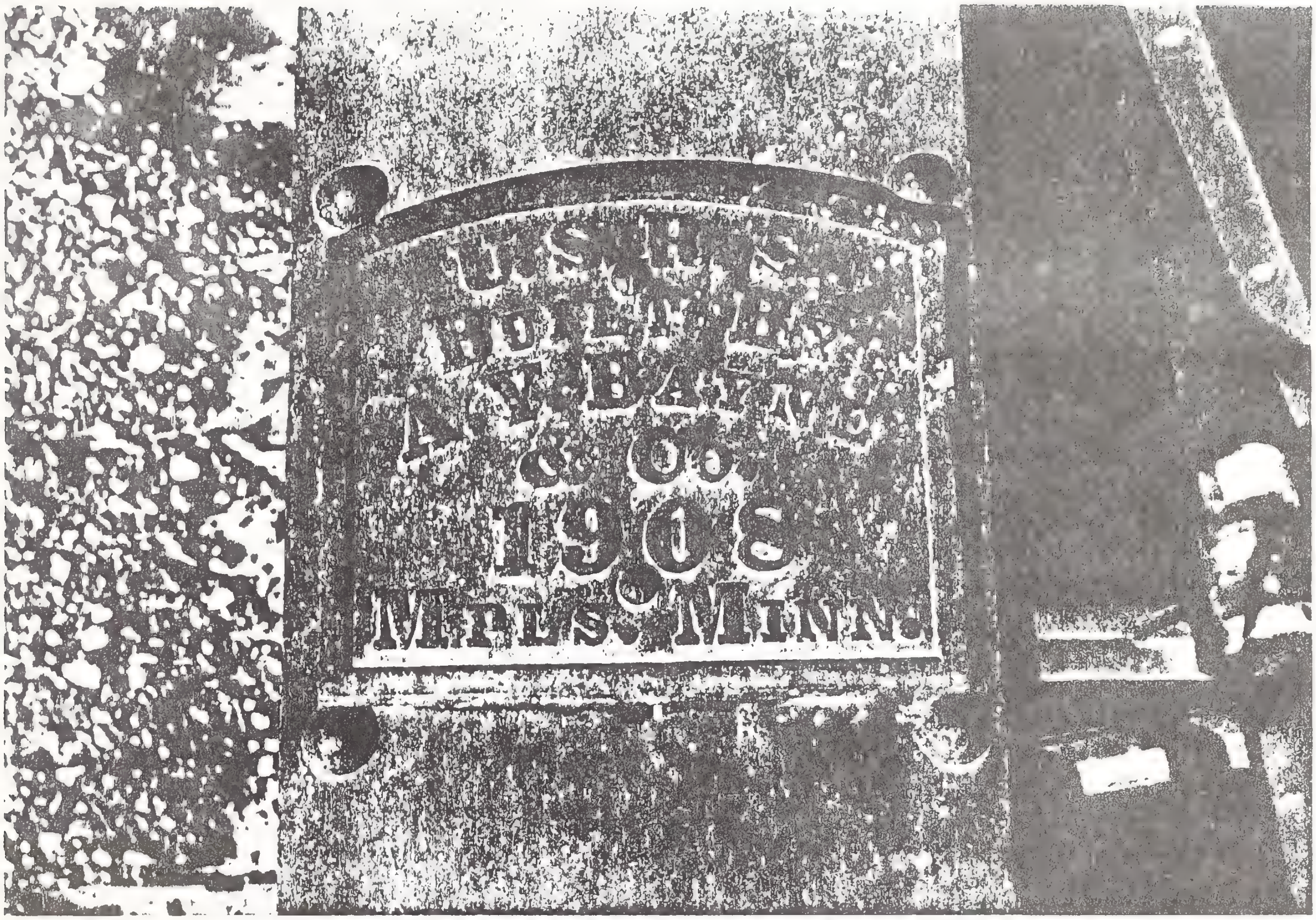


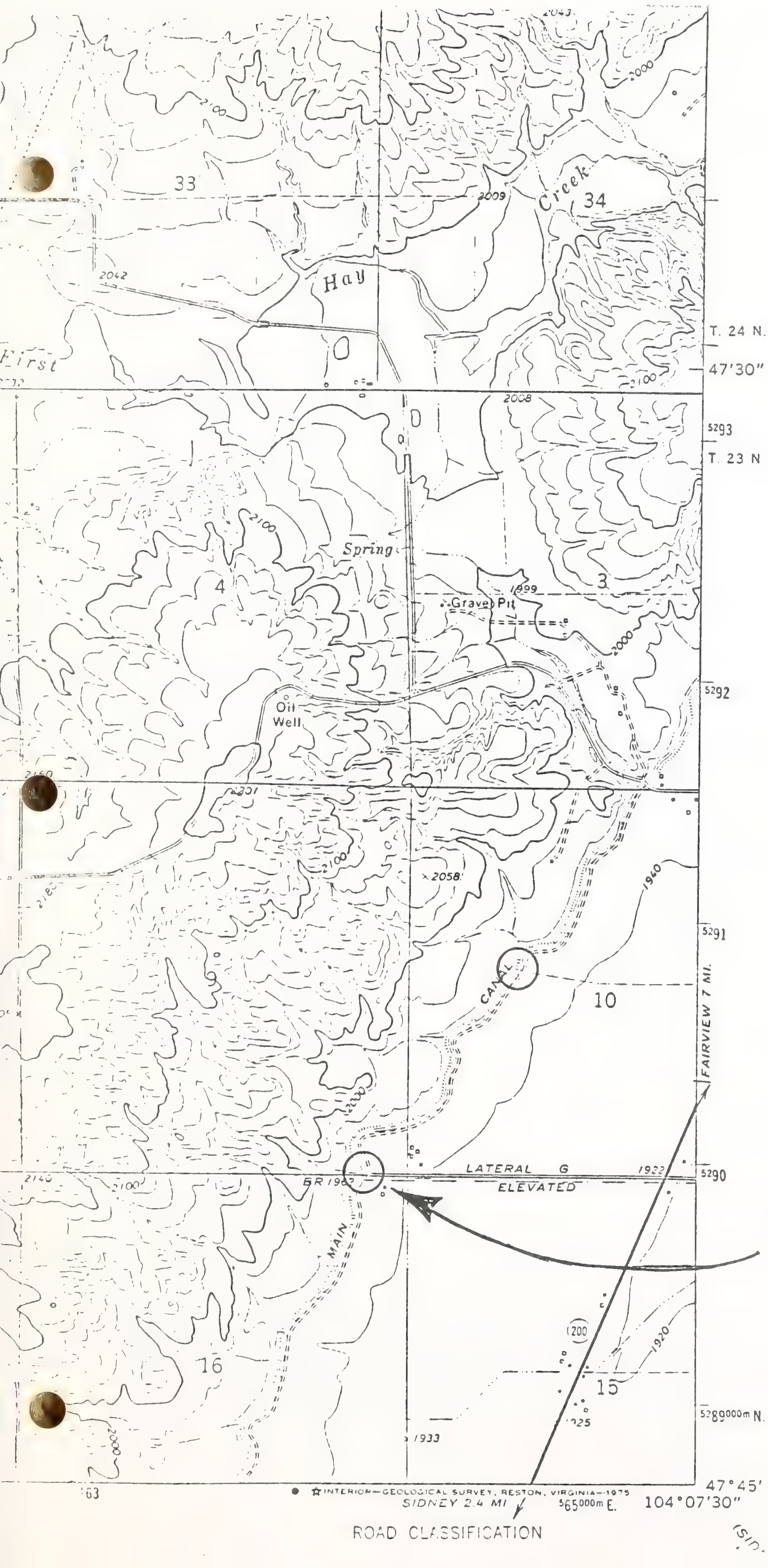
STRINGER "C"

Comments: Stringers are in Fair Condition.






U.S.H.E.S.
BUILT BY
A.Y. BAYNE
& CO.
1908
MPLS. MINN.



$\frac{242\text{-}0.8}{89\text{-C}}$ Zone 13 564185E 5289925N
NW¼NE¼NE¼ Sec. 16, T. 23 N.,R. 59 E.
Fairview SW, Mont. 1:24000 Contour 20'

Map 13

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL175* Site Name: *USRS Canal Bridge, 9 Mi. SW Fairview*
Structure Number: *L42 566 000+0.600-1 060-C* Year Built: *1908*
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *SW¼SE¼NW¼, Sec. 10 T. 23 N., R. 59*
UTM Zone: *13, 564820 E. 5290790 N.*
Quad Name: *Fairview SW, Mont.* Scale: *1:24,000*
County/City: *Richland* Route *566* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City __ Federal X Private __ Tribal __
Specify Bureau of Reclamation

PRESENT USE: *USRS Main Canal Bridge, farm access*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
  X Pin connected
  __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
X Pony (Wood Plank Deck)
__ Through
__ Combination

TRUSS DESIGN

__ King Post
X Queen Post
__ Howe
__ Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
  __ K
__ Other

Length *40'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 3, Frames 10 and 11 (Color); Roll 4, Frames 00

NARRATIVE DESCRIPTION

This single span, Queen Post Pony measures 40' in length, and is nearly 18' wide. The light truss stands 6' high and is designed as follows: the lower chord is of eyebars, while the upper chord is of continuous steel plate riveted to two channel sections that are connected on the bottom flanges by lacing bars. The verticals are four-angle sections latticed together, which are stabilized by knee braces of double angles. Diagonals cross in the center panel of eyebars, and eyebars with turnbuckles. The guardrail is two angle sections connected with lattice bars.

NARRATIVE HISTORY

This site, Station 2510, originally was planned to have a combination wood and steel truss, then later, a 40' light truss was substituted. This bridge fits that description and probably is original to this location. At one time a road crossed this section going east-west, using this bridge to cross the canal. Now that road has been removed, and access to the bridge is only by the canal road. A plowed field is on the east and the west side of the canal. A barbed wire fence is stretched across the west end of the bridge to limit access.

INTEGRITY *Good, but poor condition. The guardrail is bent at the approaches. Sufficiency rating was 26.9 in 1986.*

Altered Unaltered *X* Moved *Probably Not* Date
Summary of Move:

SIGNIFICANCE

As one of the USRS Canal bridges, it is historically significant; its condition, however, is very poor.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 25, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Area is disturbed by canal and road construction, and by leveling fields for irrigation.*

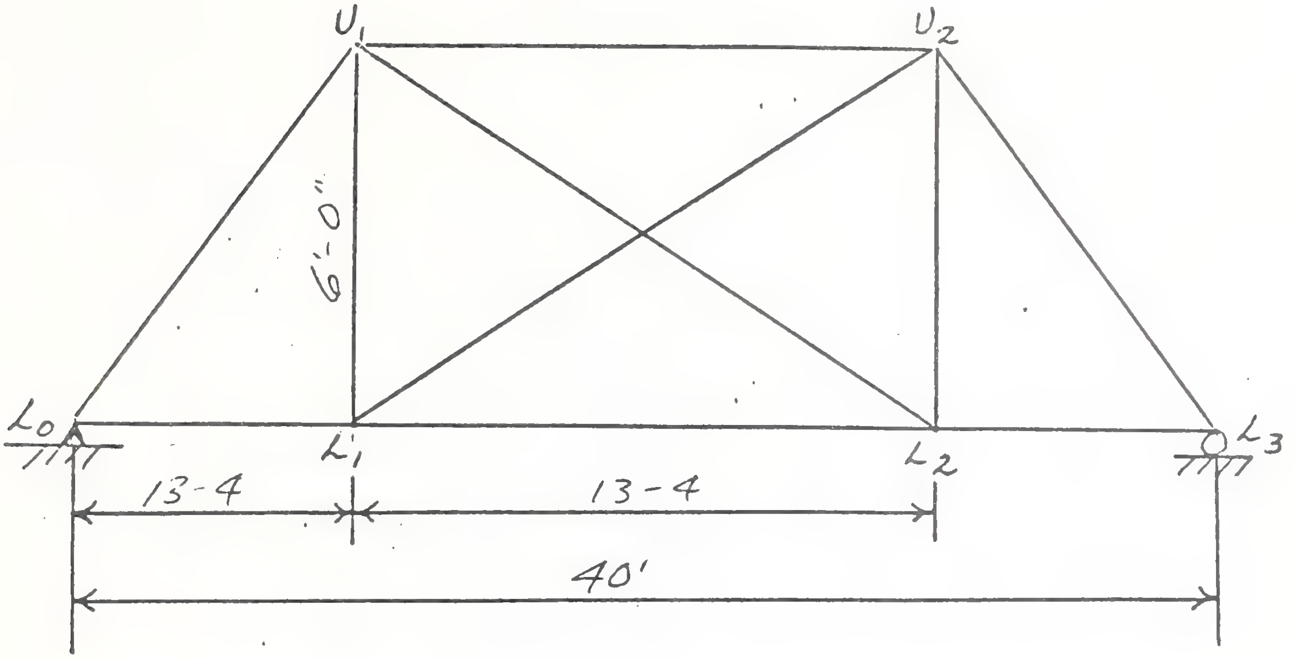
Was historical/architectural survey conducted around the structure?

Yes X No __

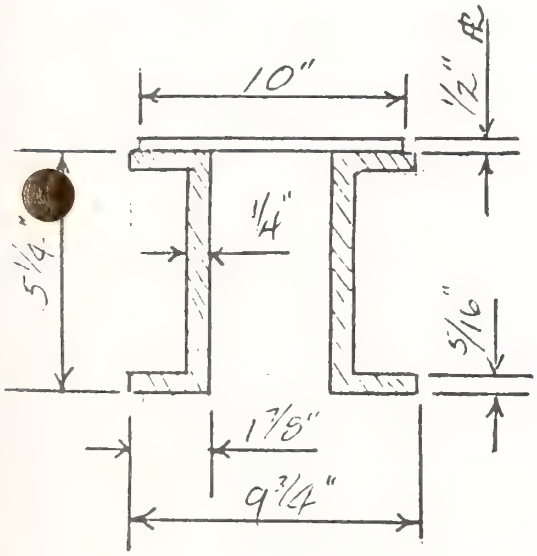
Results negative X

Comments: *There are no buildings near.*

EV:cm:1/ff

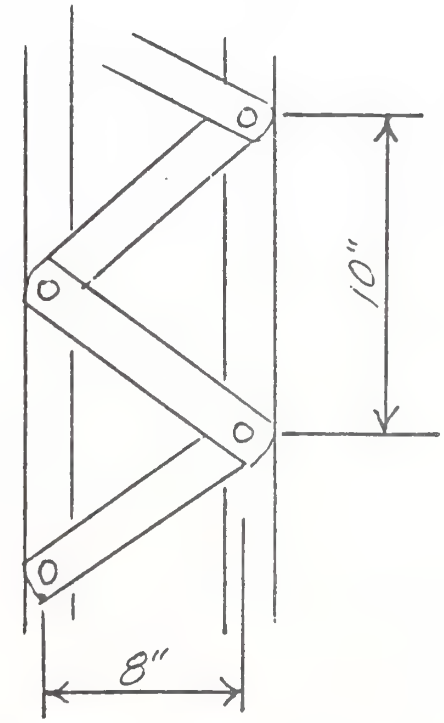


From Center of upstream Truss to Center of downstream Truss = 19'-0"



End Posts & Top Chord

($L_0 U_1$; $U_1 U_2$; $U_2 L_3$).



(Bottom side)
$\frac{1}{4}$" x $1\frac{1}{2}$" strapping

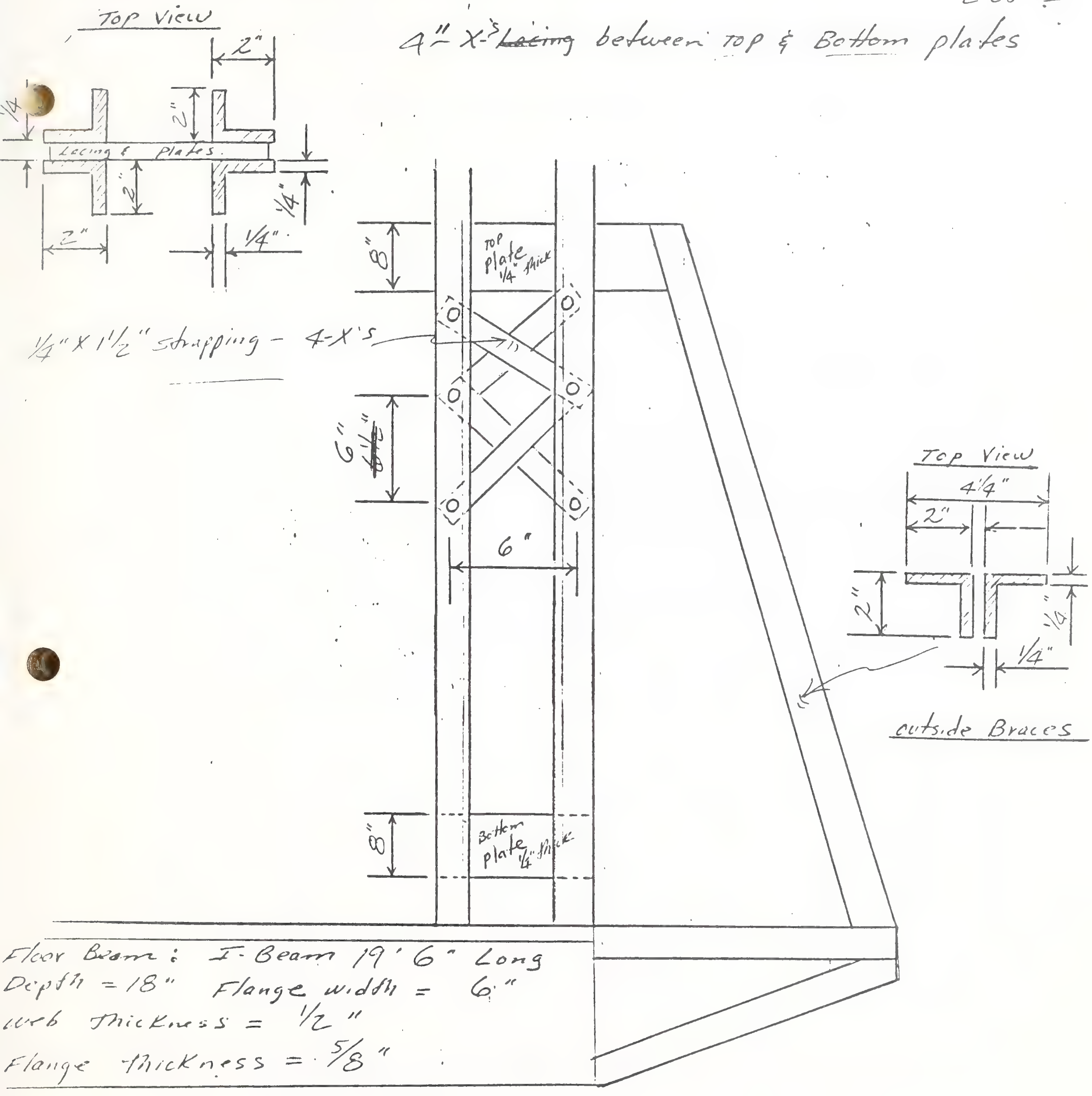
Lower Chord & Diagonals

([illegible] L_1; $L_1 L_2$; $L_2 L_3$) 2- eye bars $\frac{5}{8}$" x $2\frac{1}{2}$".

($U_1 L_2$) – 1" square Rod.

($U_2 L_1$) – 1" square Rod.

4" X-'s ~~Lacing~~ between Top & Bottom plates



Floor Beam: I-Beam 19' 6" Long
Depth = 18" Flange width = 6"
web Thickness = 1/2"
Flange Thickness = 5/8"

Vertical Members & outside Bracing

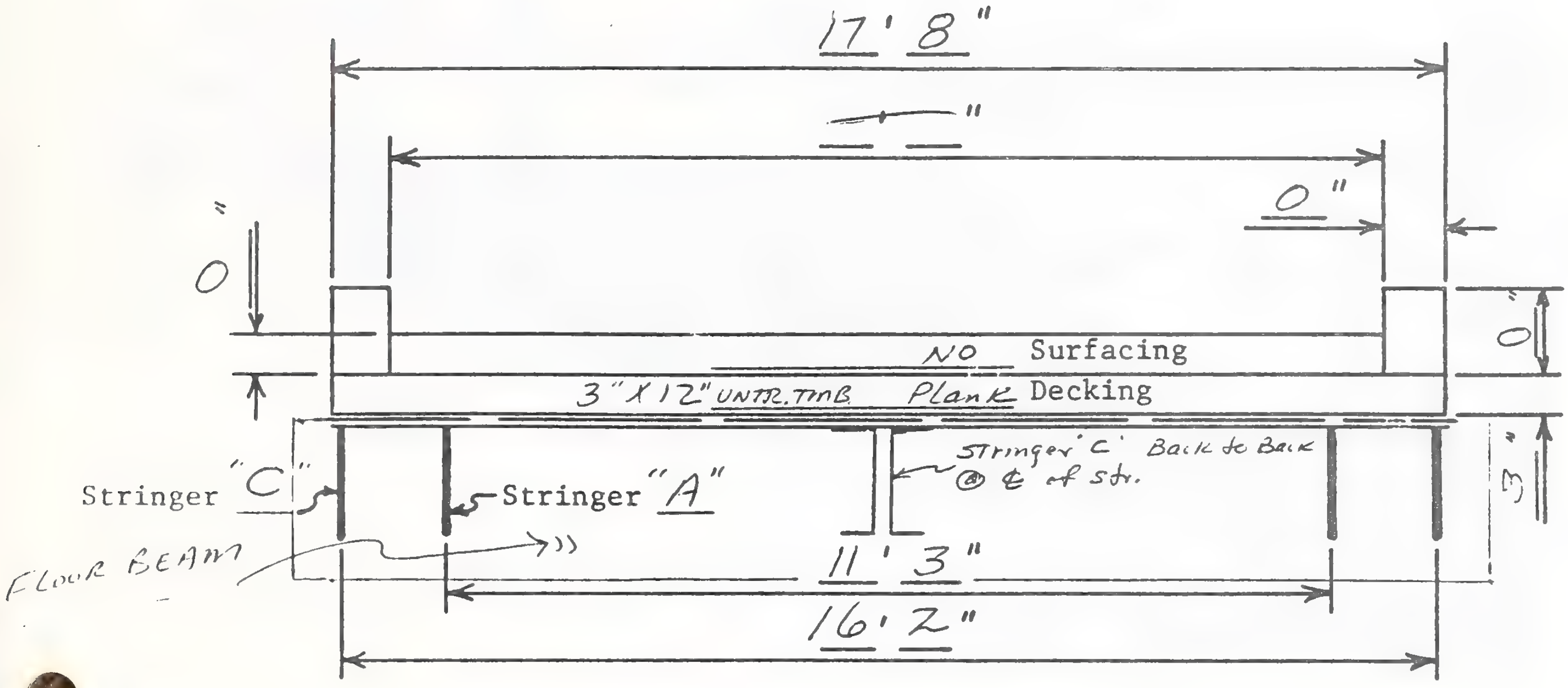
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

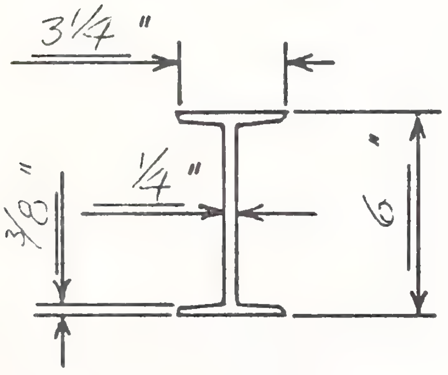
Structure Number L42 566-0.6 Span(s) 1

Inspector K.Q.

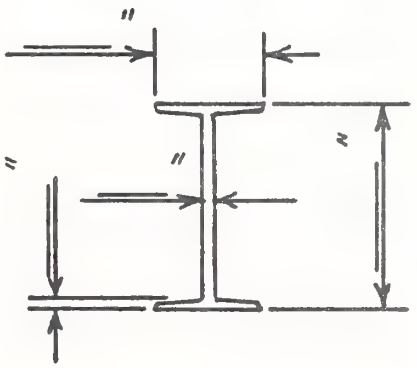
Date 10-12-84



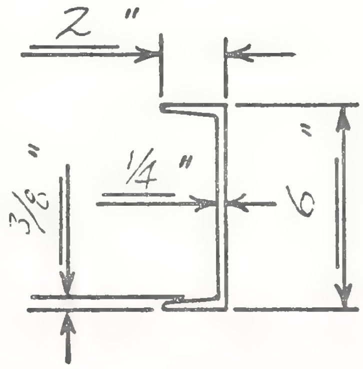
10 Stringers (total) Span Length 40' 0"



STRINGER "A"

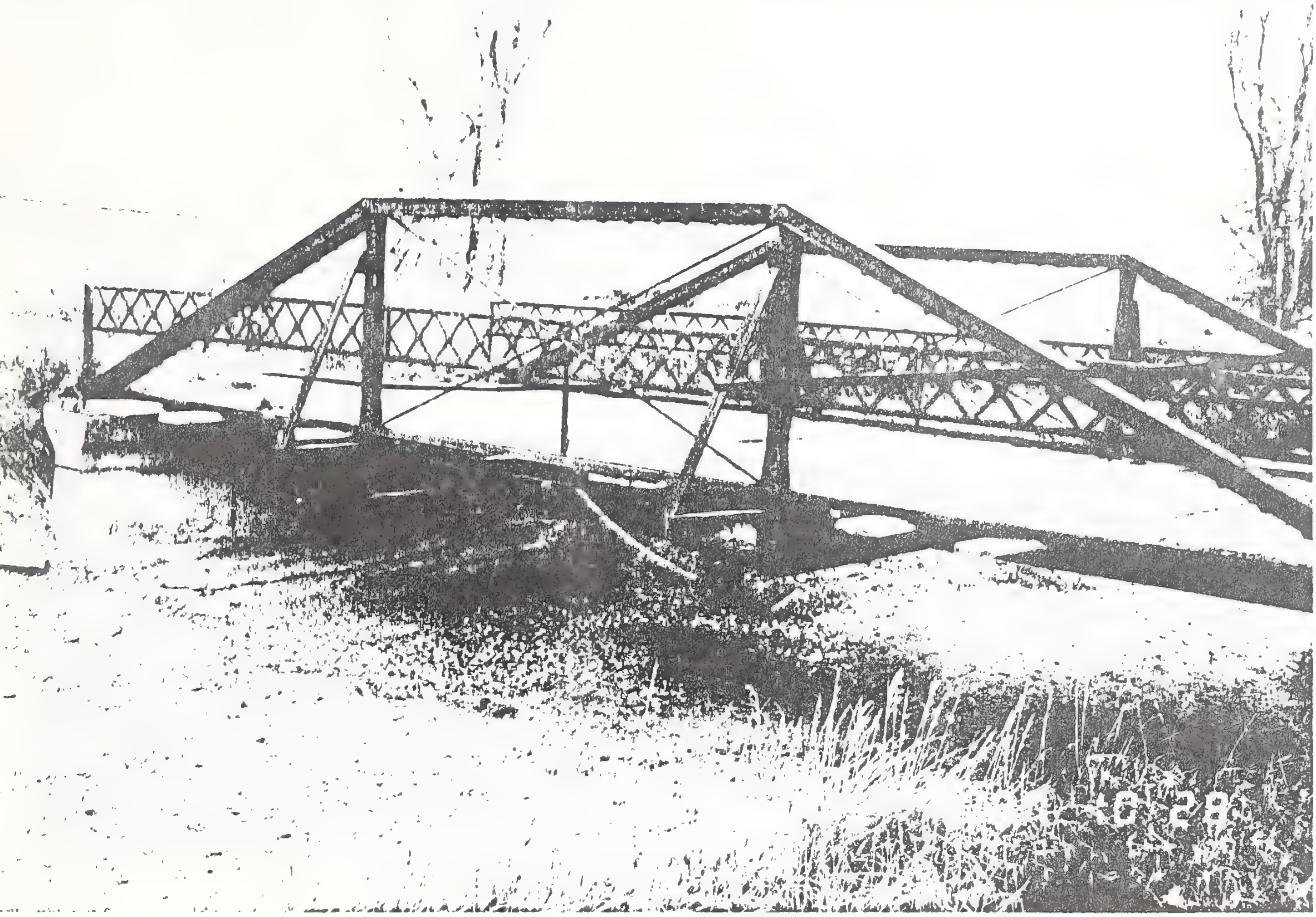


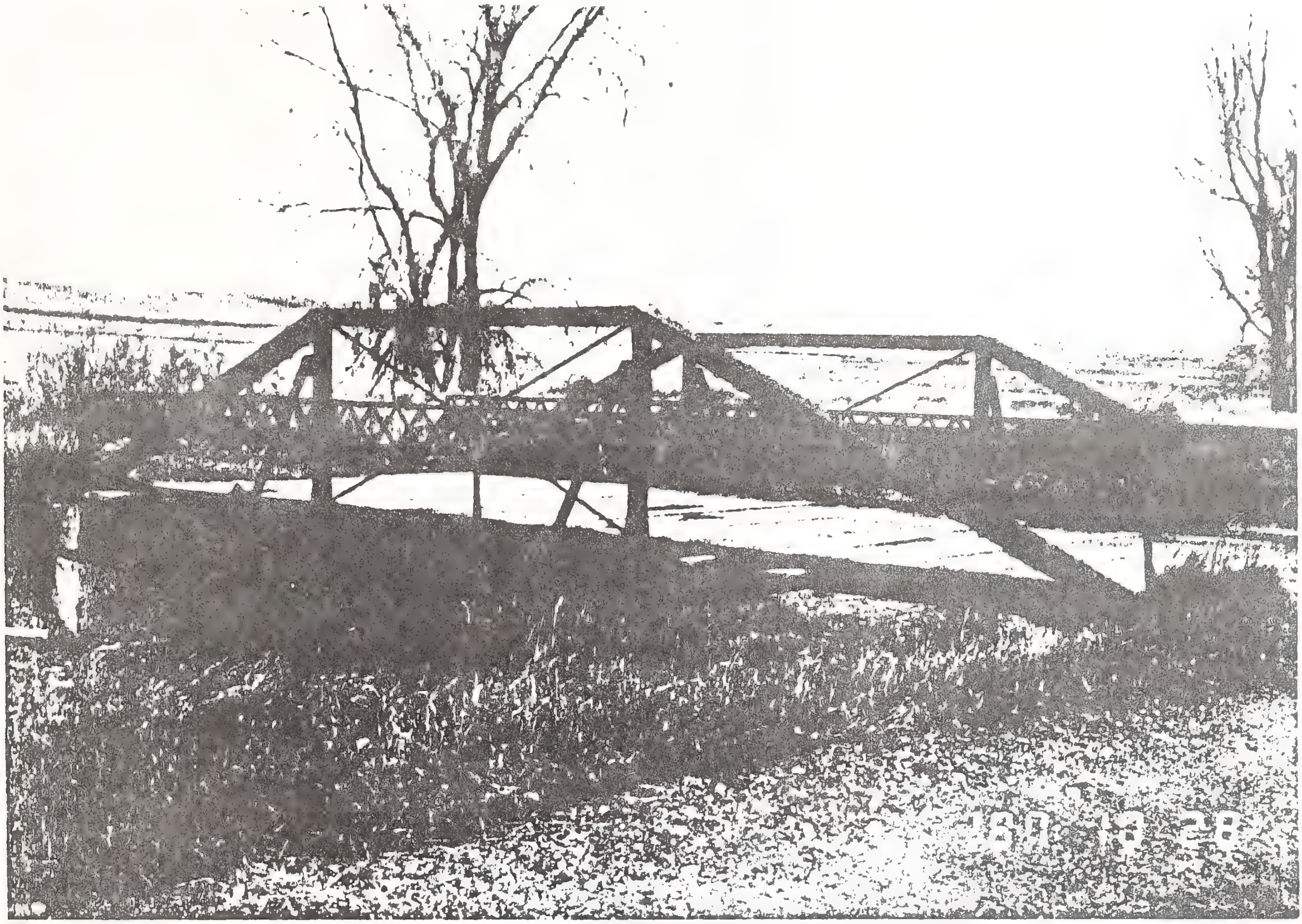
STRINGER "B"

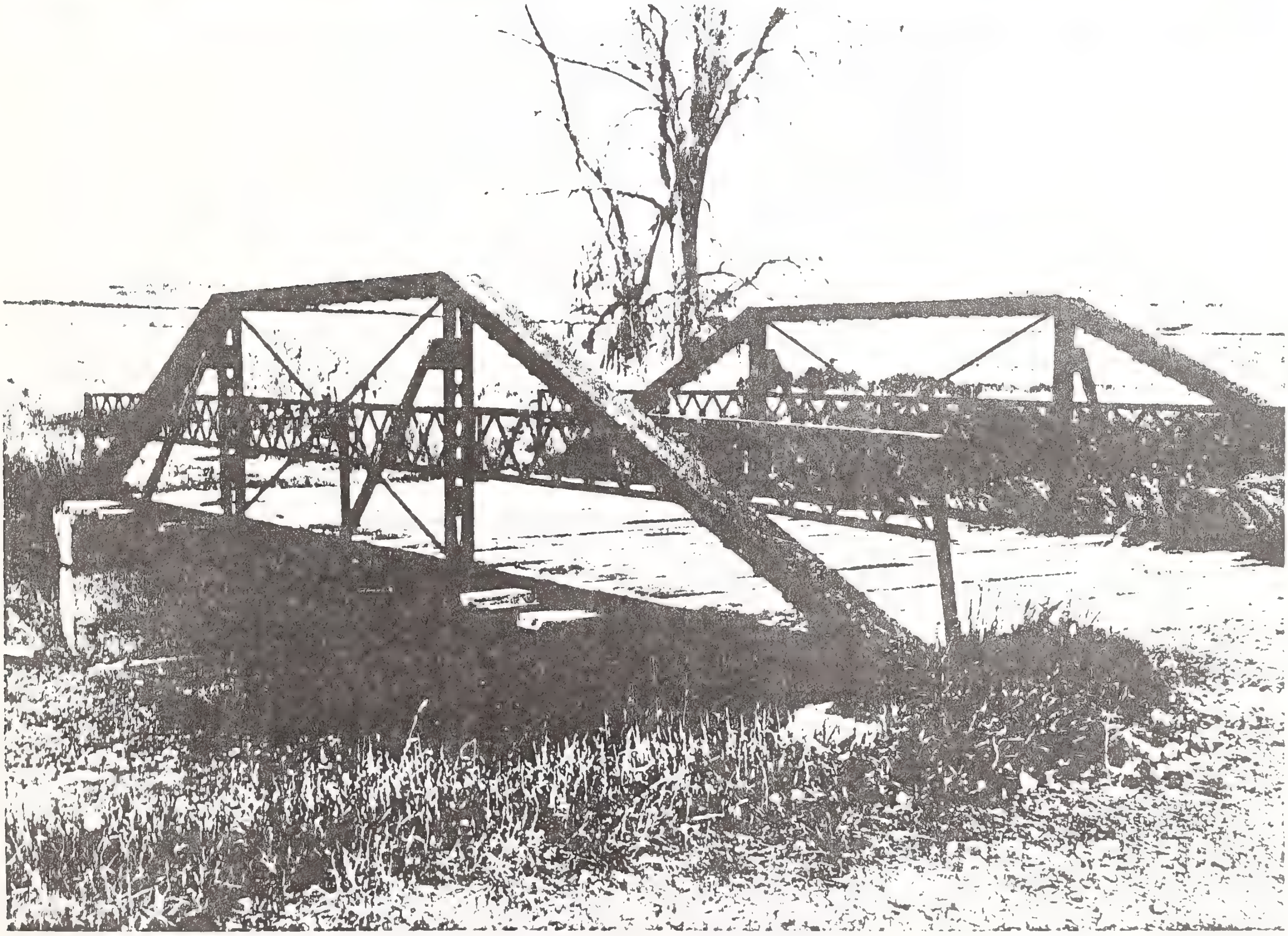


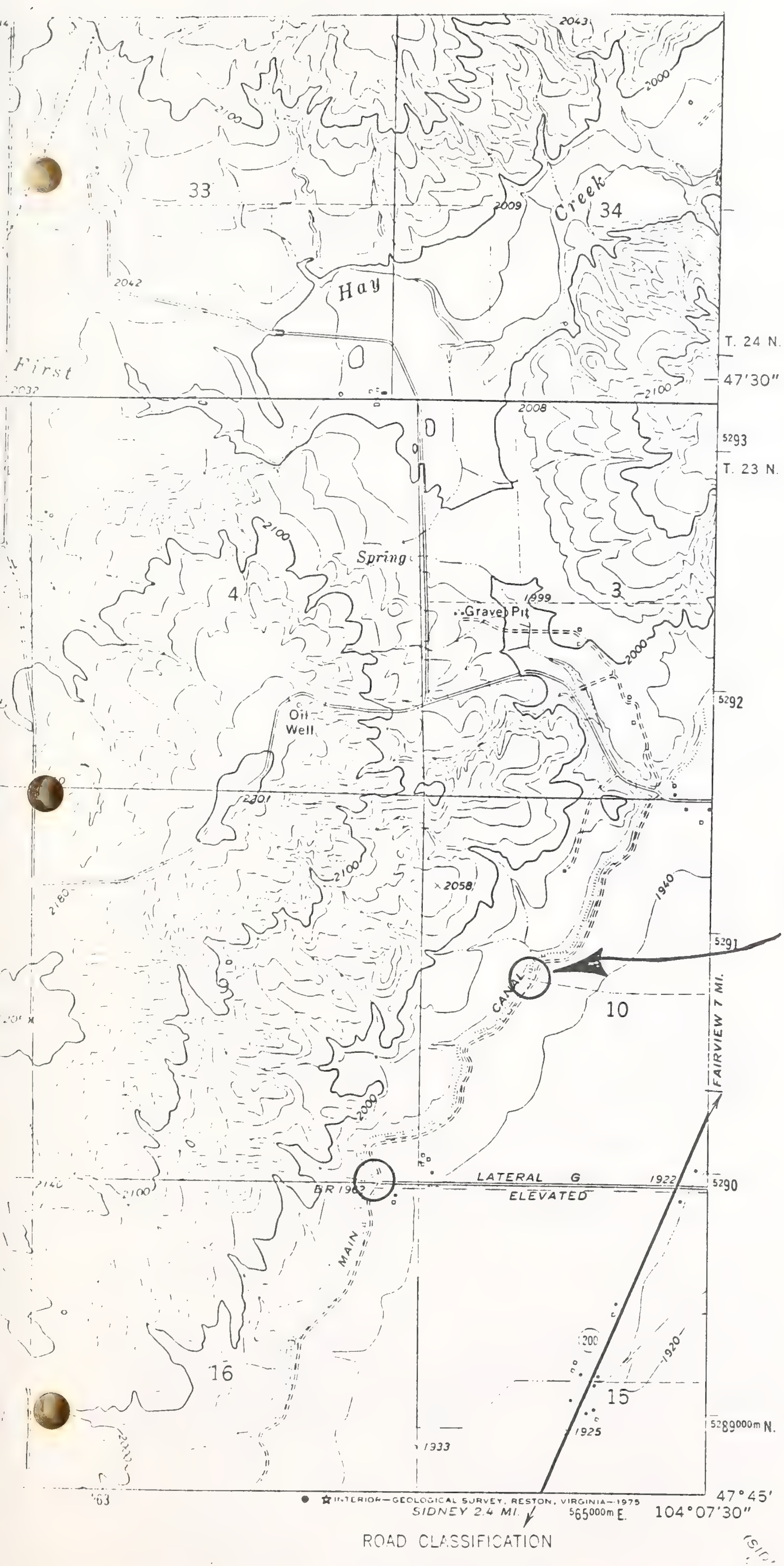
STRINGER "C"

Comments: Dbl Channels @ ℄ Str., stringers are in Fair Condition (Light Rust). see photo for Floor Beam Connection to stringers.


6 28


'80 12 28





566-0.6
60-C Zone 13 564820E 5290790N
Fairview SW, Mont. 1:24000 Contour 20'
SW¼SE¼NW¼ Sec. 10, T. 23 N., R. 59 E.

Map 13

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL176* Site Name: *USRS Canal Bridge, 6 Mi. SW Fairview*
Structure Number: *L 42 565 000+0.300-1 067-C* Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *Center West Section Line, Sec. 2 T. 23N., R. 59 E.*
UTM Zone: *13, 565985 E. 5292360 N.*
Quad Name: *Fairview, Mont.* Scale: *1:24,000*
County/City: *Richland* Route *565* Mile Crossing *Main Canal*

OWNERSHIP: MDOH ☐ County/City ☐ Federal ☒ Private ☐ Tribal ☐
Specify Bureau of Reclamation

PRESENT USE: *USRS Canal Bridge, Lower Yellowstone Project, Farm Vehicle Access*

BASIC BRIDGE (check as appropriate)

- ☐ Beam, Slab, Girder
- ☐ Suspension
- ☐ Arch
- ☐ Movable
- ☒ Truss
  - ☒ Pin connected
  - ☐ Rigid

MATERIALS

- ☐ Wood
- ☒ Metal
- ☐ Combination
- ☐ Stone
- ☐ Reinforced Concrete
- ☐ Prestressed Concrete

TYPE

- ☐ Deck
- ☒ Pony (Wood Plank Deck and Running Boards)
- ☐ Through
- ☐ Combination

TRUSS DESIGN

- ☐ King Post
- ☒ Queen Post
- ☐ Howe
- ☐ Pratt
  - ☐ Double Intersection
  - ☐ Half Hip
  - ☐ Parker
  - ☐ Camelback
  - ☐ Pennsylvania (Petit)
    - ☐ Sub Struts
    - ☐ Sub Ties
  - ☐ Baltimore
- ☐ Lenticular
- ☐ Warren
  - ☐ Verticles
  - ☐ Polygonal Chord
  - ☐ Double Intersecting
  - ☐ Quadrangular
- ☐ K
- ☐ Other

Length *40'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 4, Frames 1, 2 and 3

NARRATIVE DESCRIPTION

This single span, pin-connected Queen Post Pony steel truss measures 40' with three panels of 13 1/3' each. It is nearly 18' wide and 6' high. The bottom chord is of forged steel eyebars, and the top chord is of continuous steel plate. It is riveted to two channel sections that are closed on the bottom flanges with lacing bars. The vertical members are four angle sections connected with lattice bars. Knee braces of double angles are riveted to the floor beam and then rise to near the top of the verticals where they are riveted in place with an 8" plate. The diagonals are eyebars and eyebars with turnbuckles. The guardrail is lattice bars connecting two angle sections.

NARRATIVE HISTORY

This is Station 2585. The combination wood and steel truss was to have been built here, then plans changed and a 40' light steel truss was substituted. Apparently no combination wood and steel trusses were built, or at least none survived in place. The bridge plays a minor role as a crossing, leading to a dead end road on the west side of the canal. Access is limited by barbed wire.

INTEGRITY *Good. Sufficiency rating was 26.9 in 1986.*

Altered Unaltered *X* Moved *Probably Not* Date
Summary of Move:

SIGNIFICANCE

The bridge is historically significant as one of the USRS Main Canal bridges on the Lower Yellowstone Project.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 25, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Canal and road construction and field leveling have altered the surface.*

Was historical/architectural survey conducted around the structure?

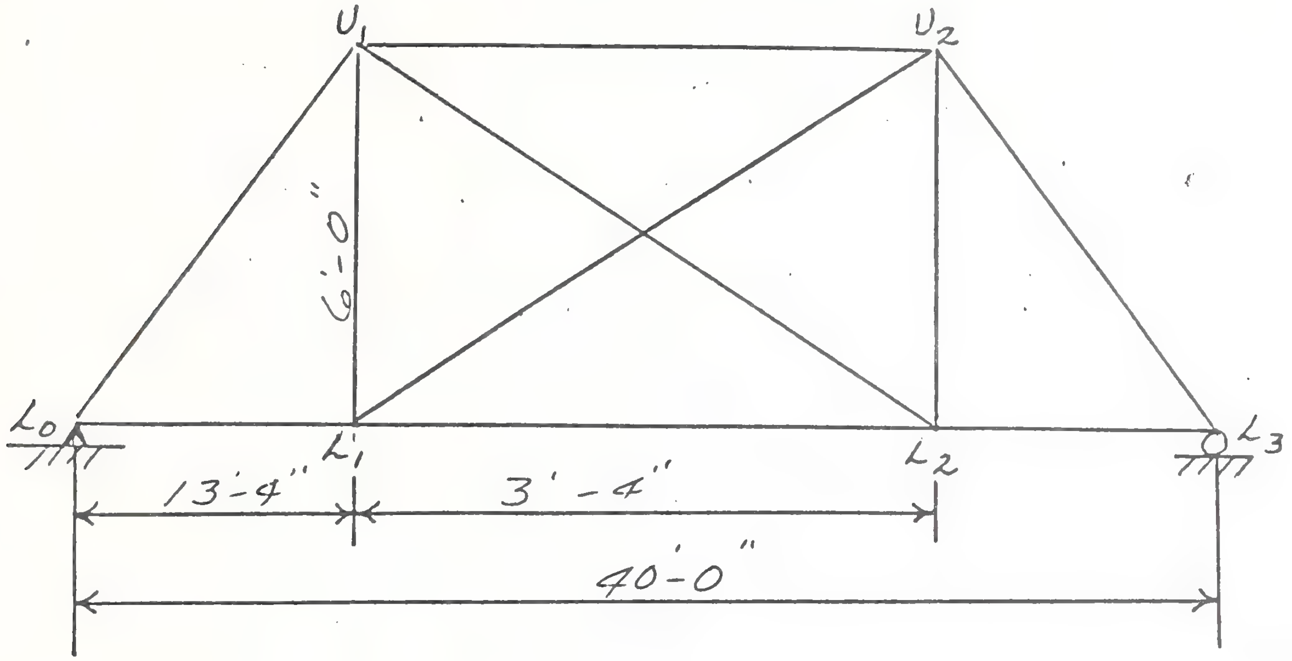
Yes X No __

Results negative X

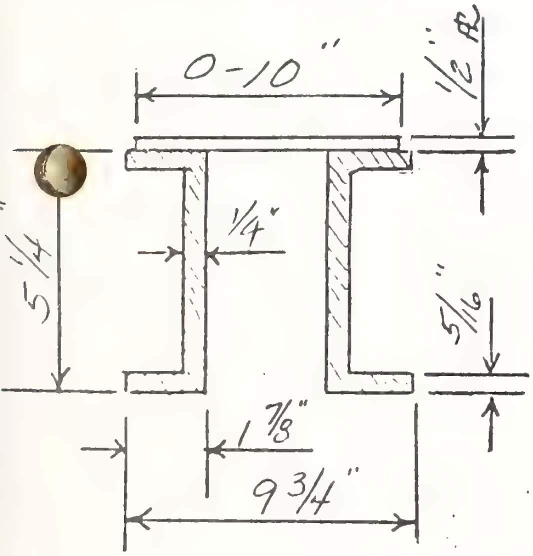
Comments: *A shed-roof pumphouse is situated northwest of the bridge. It has shiplap siding, metal roofing, and a very small entry door. I observed the "no trespassing" sign.*

EV:cm:1/cc

-65 000+0.3001 USR.S Main Canal (67) 1 of 3

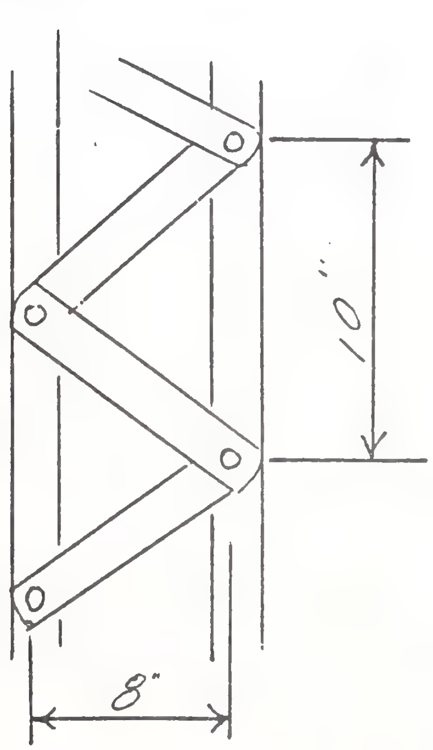


From Center of upstream Truss to Center of downstream Truss = 19'-0"



End Posts & Top Chord

(L_0U_1; U_1U_2; U_2L_3).



(Bottom side)
1/4" x 1 1/2" strapping

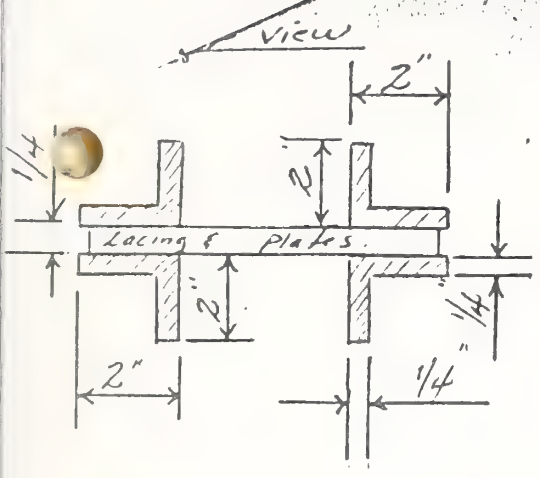
Lower Chord & Diagonals

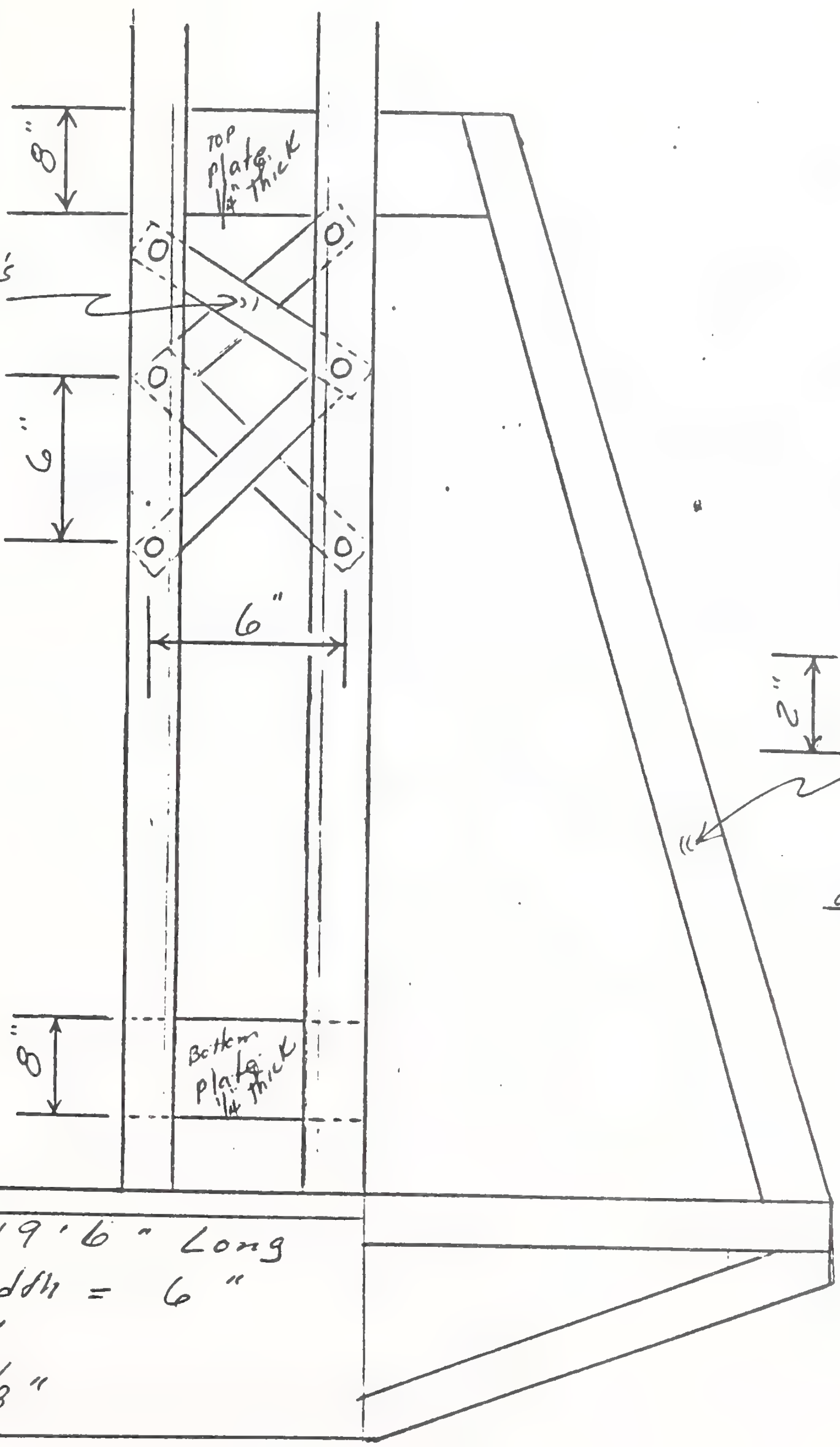
(L_0L_1; L_1L_2; L_2L_3) 2- eye bars 5/8" x 2 1/2"

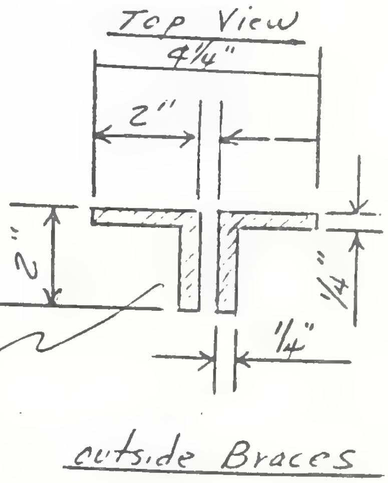
(U_1L_2) – 1" Square Rod

(U_2L_1) – 1" Square Rod

4" X-Lacing between Top & Bottom plates







Floor Beam: I-Beam 19'6" Long
Depth = 18" Flange width = 6"
web thickness = 1/2"
Flange thickness = 5/8"

Vertical Members & outside Bracing

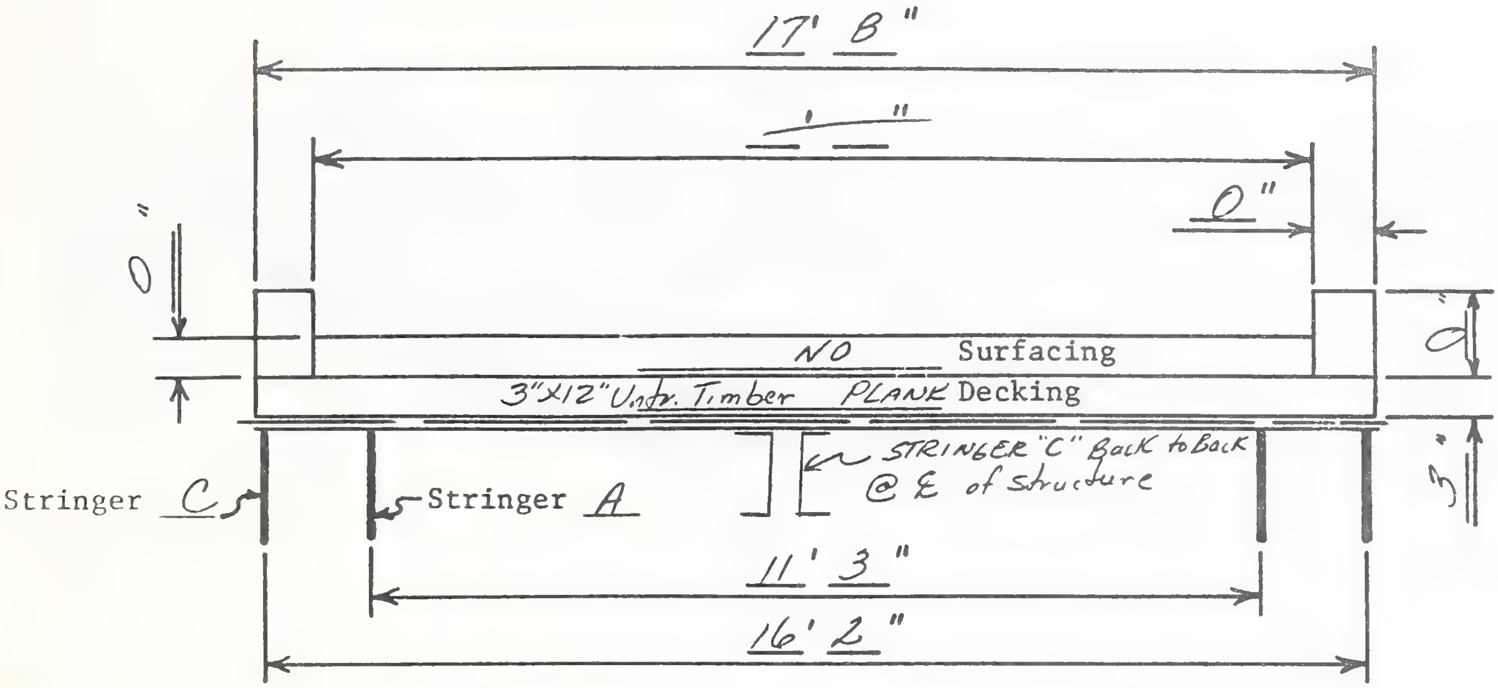
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number C42565 000+0.3001 Span(s) 1

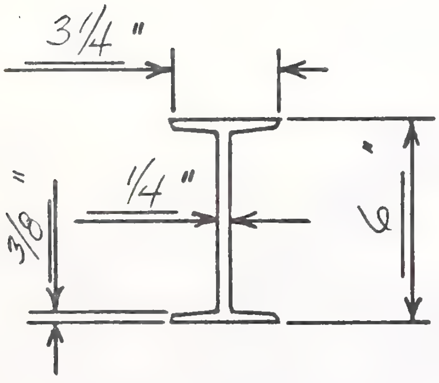
Inspector K.Q.

Date 10-12-84

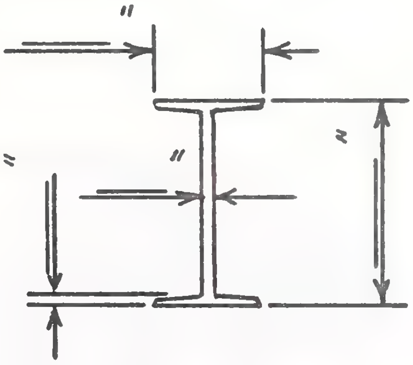

17' 8"
' "
0"
0"
d
NO Surfacing
3"X12" Untr. Timber PLANK Decking
Stringer C
Stringer A
STRINGER "C" Back to Back @ ℄ of Structure
3"
11' 3"
16' 2"

10 Stringers (total)

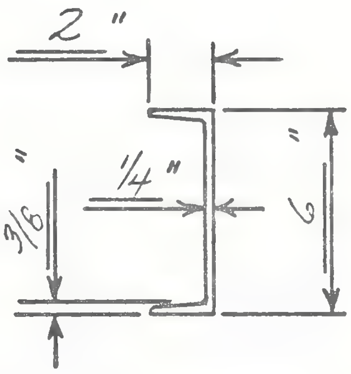
Span Length 40' 0"



STRINGER "A"

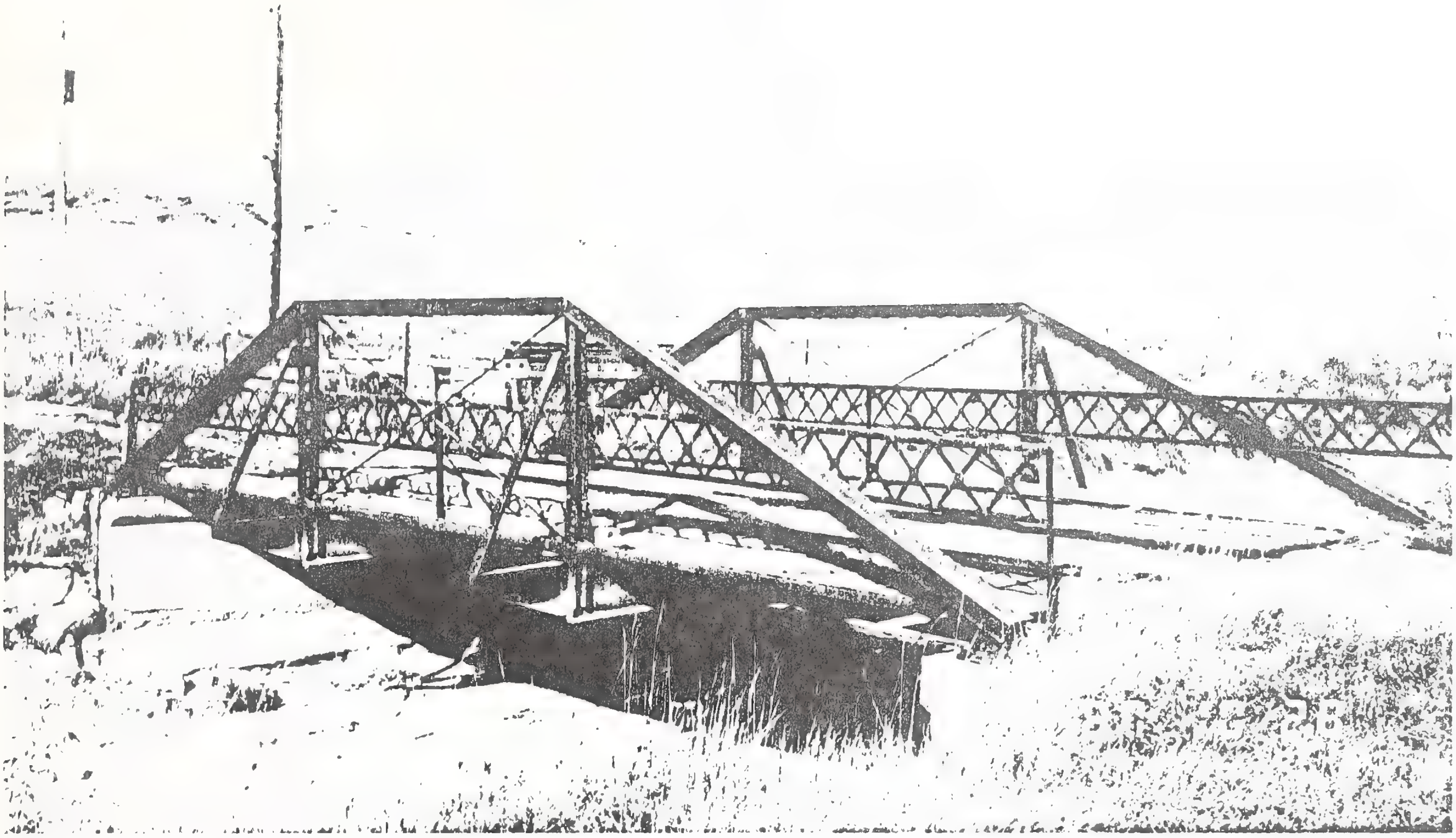


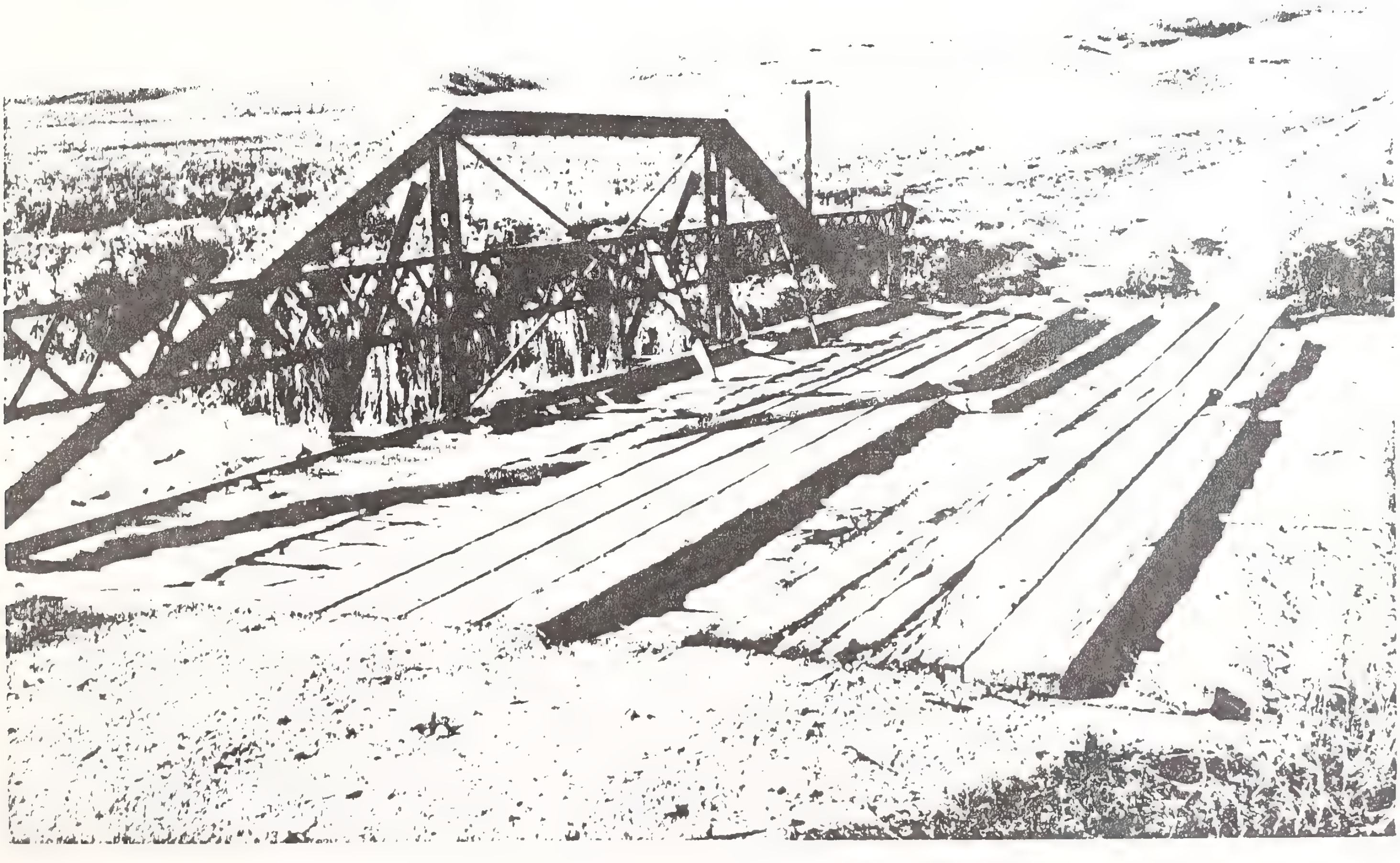
STRINGER "B"

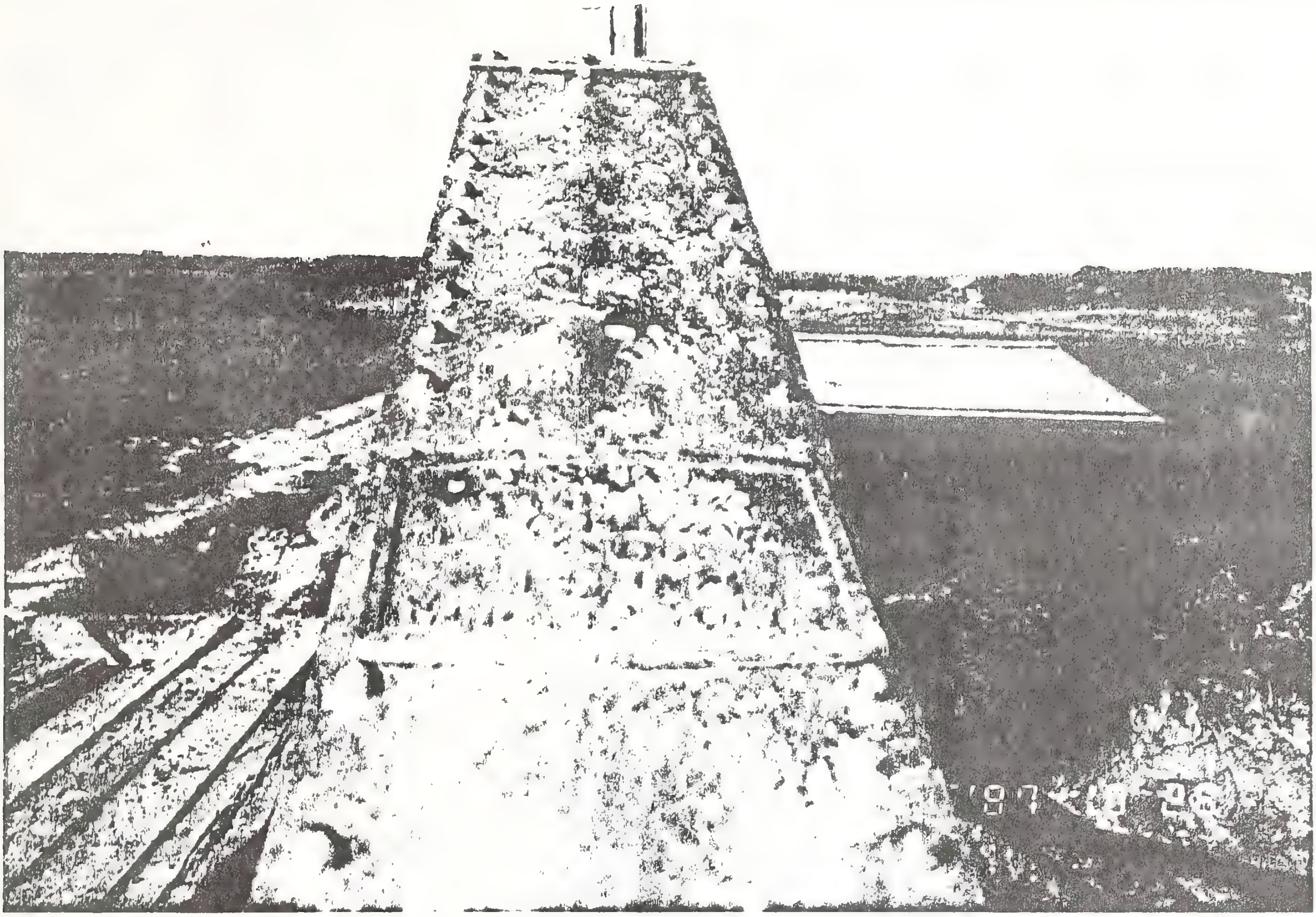


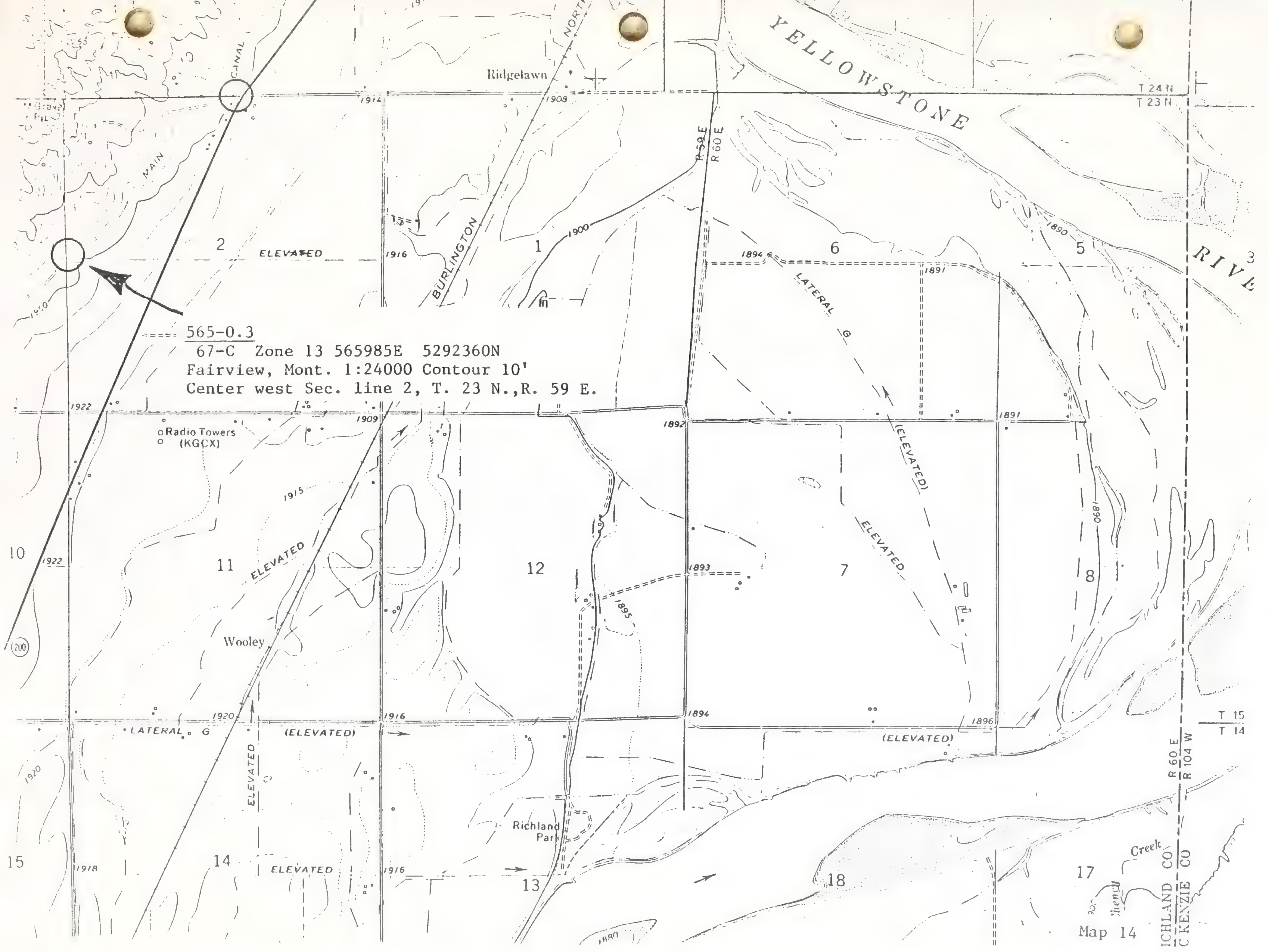
STRINGER "C"

Comments: Dbl. Channels @ ℄ Str., stringers are in fair condition (Light Rust). See photos for floor beam connection to stringers.






'97 10 26



565-0.3
67-C Zone 13 565985E 5292360N
Fairview, Mont. 1:24000 Contour 10'
Center west Sec. line 2, T. 23 N., R. 59 E.

Map 14

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL177* Site Name: *USRS Canal Bridge - 6 Mi. S.W. Fairview*
Structure Number: *L42 245 000+0.100-1 066-C* Year Built: *1908*
Evaluation Determined Eligible ☐
Ineligible ☐
Date ☐

LOCATION: *Center N. Sec. line, Sec. 2 T. 23 N. R. 59 E.*
UTM Zone: *13, 566 795 E. 5293200 N.*
Quad Name: *Fairview, Montana - North Dakota* Scale: *1:24,000*
County/City: *Richland* Route *245* Mile Crossing *Main Canal*

OWNERSHIP: MDOH ☐ County/City ☒ Federal ☐ Private ☐ Tribal ☐
Specify Richland

PRESENT USE: *USRS Main Canal Bridge, local access.*

BASIC BRIDGE (check as appropriate)

- ☐ Beam, Slab, Girder
- ☐ Suspension
- ☐ Arch
- ☐ Movable
- ☒ Truss
  - ☒ Pin connected
  - ☐ Rigid

MATERIALS

- ☐ Wood
- ☒ Metal
- ☐ Combination
- ☐ Stone
- ☐ Reinforced Concrete
- ☐ Prestressed Concrete

TYPE

- ☐ Deck
- ☒ Pony
- ☐ Through
- ☐ Combination

TRUSS DESIGN

- ☐ King Post
- ☒ Queen Post
- ☐ Howe
- ☐ Pratt
  - ☐ Double Intersection
  - ☐ Half Hip
  - ☐ Parker
  - ☐ Camelback
  - ☐ Pennsylvania (Petit)
    - ☐ Sub Struts
    - ☐ Sub Ties
  - ☐ Baltimore
- ☐ Lenticular
- ☐ Warren
  - ☐ Verticles
  - ☐ Polygonal Chord
  - ☐ Double Intersecting
  - ☐ Quadrangular
- ☐ K
- ☐ Other

Length *36'* Width *17.3'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A. P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A. Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 4, Frames 4 and 5.

NARRATIVE DESCRIPTION

The single span, pin-connected Queen Post pony is 36' long, with three 12' panels, 6' high and 17' wide. the lower chord is forged steel plate riveted to 2 channel sections that are laced along the bottom flanges. The verticals are 4 angle sections latticed together. Knee braces are riveted to the floor beam, then rise to the upper vertical where they are connected by an 8" plate. Diagonals are eyebars and eyebars with turnbuckles. The guardrail is the familiar latticed angle sections, but on this bridge it sits directly on the deck. The floor beam - stringer system was replaced, using 18" I beams. This raised the deck 8", taking up the space below the guardrail. This change in proportions is distracting.

NARRATIVE HISTORY

This bridge does not have the 1908 A. Y. Bayne name plate, but there is no doubt that it is the original USRS light truss at Station 2625, which was reported as 36' long. Bridge Bureau files mistakenly report it as 1930 and as 1910 construction, instead of 1908. The Reclamation Service records fail to deal adequately with the short trusses. Drawing 3 of Specification 136 for the "typical steel pony truss" shows the smallest size as 40' in length. the combination wood and steel, drawing 6, allows for 26', 28', 34', 38' and 42' Queen Posts, and 48', 50' and 52' 4-panel bridges. When steel was determined to replace the combination bridges, only one 36' was ordered, and it was for this site.

This bridge leads to an oil field west of the canal, some irrigated acreage, and a rural road that leads north, northwest about 2 miles. The oil drilling equipment is probably its heaviest load.

INTEGRITY *Poor.*
Sufficiency rating of 56.9 in 1986.
Altered X Unaltered Moved *Probably Not* Date
Summary of Move:

SIGNIFICANCE

It is historically significant as one of the USRS Main Canal Bridges, but its appearance has been altered, and it probably would not qualify for listing on the National Register of Historic Places.

PROPOSED IMPACTS/RECOMMENDATIONS

None.

Site Recorded By: *Edrie Vinson* Date: *January 25, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Ground disturbance from cause and road construction precluded the possibility of finding intact archaeological resources.*

Was historical/architectural survey conducted around the structure?

Yes X No __

Results negative X

Comments: *A historic building is located west, northwest above 1,000'. It was not recorded. East of the canal is a recently modified older home. It was not recorded either.*

EV:1:mb:255/d

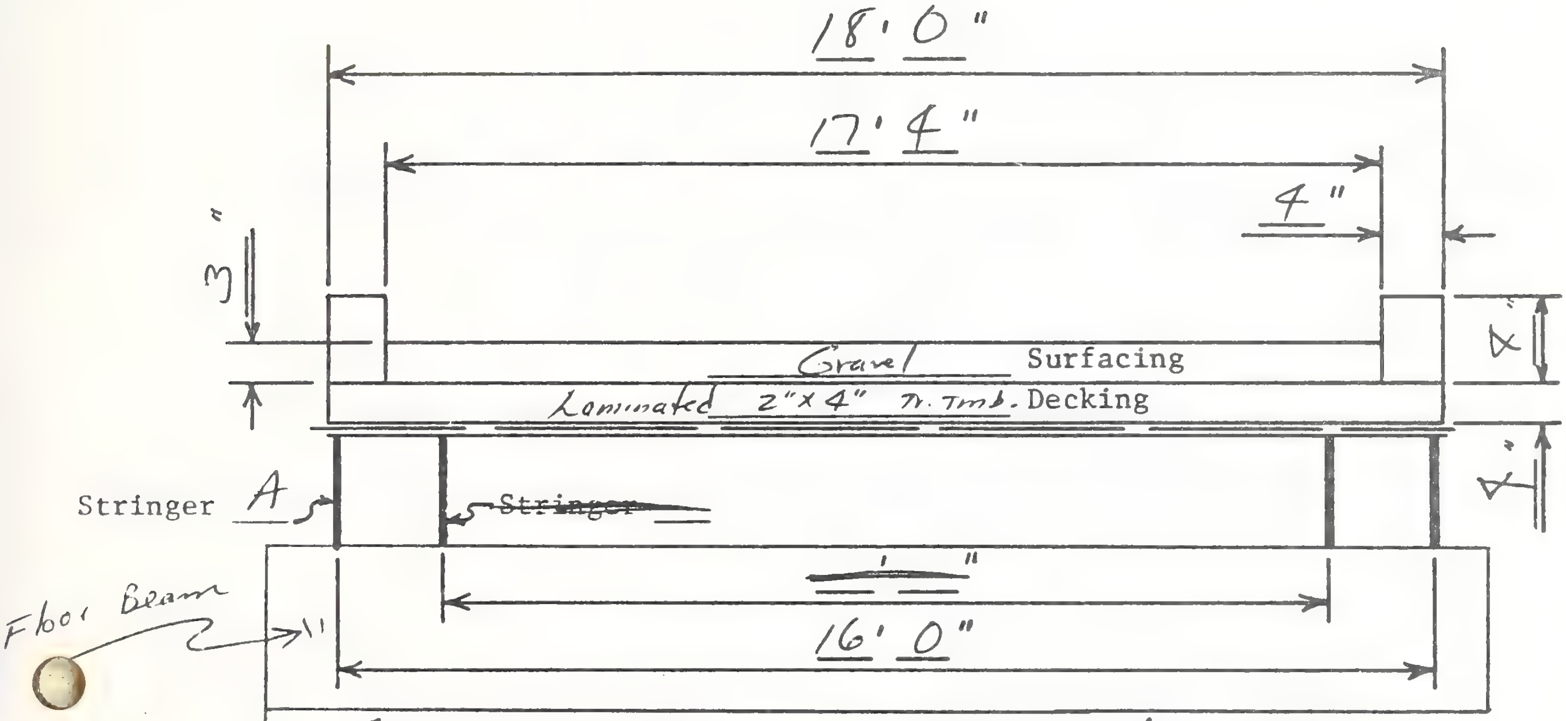
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Structure Number L42245-01 ~~L42084 00070.030~~ Span(s) TRUSS

Sheet 3 of 3

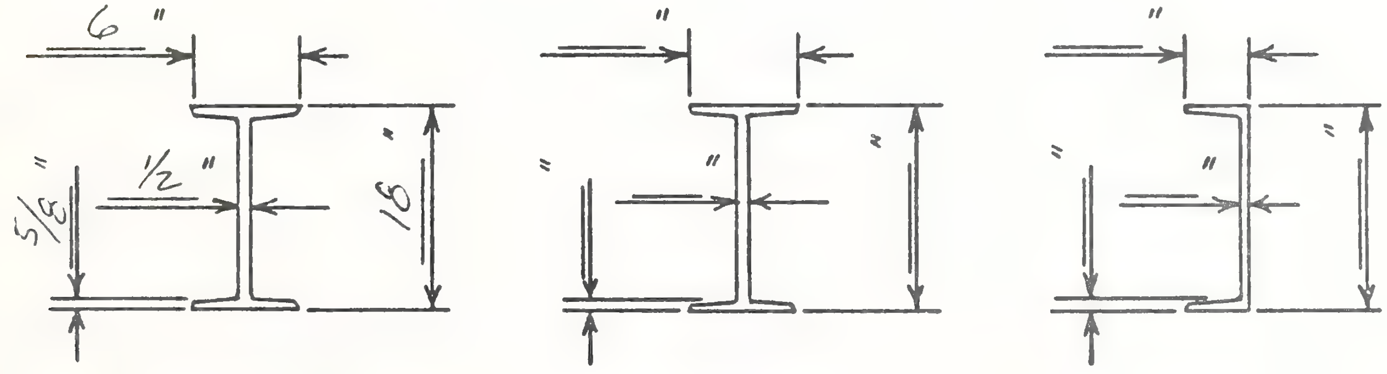
Inspector K.Q.

Date 7-25-79



7 Stringers (total)

Span Length 36' 0"

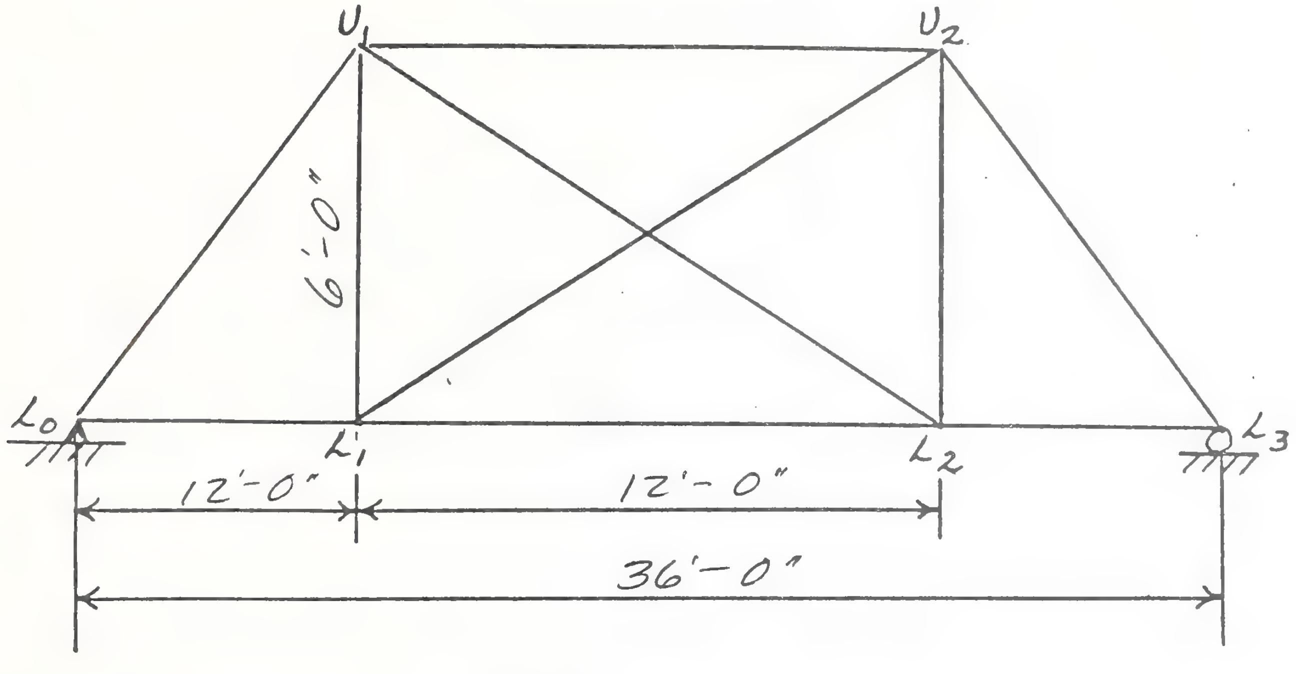


STRINGER "A" STRINGER "B" STRINGER "C"

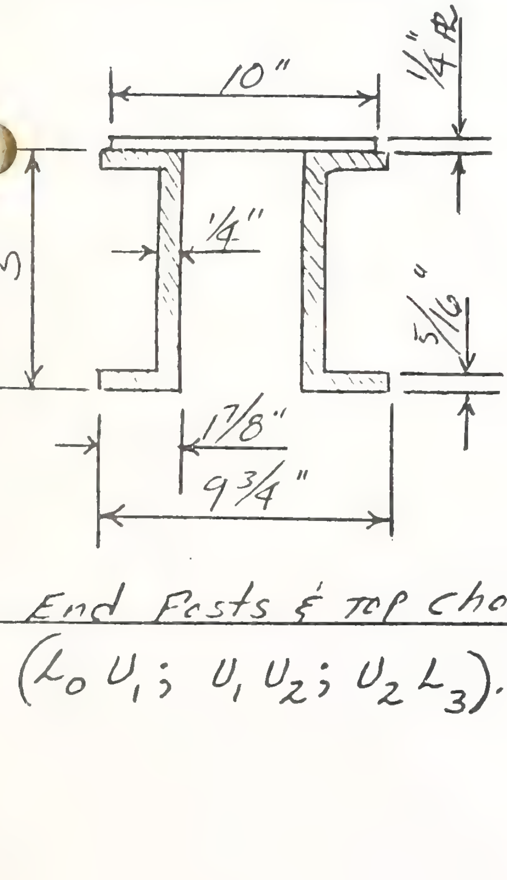
Comments: Stringers are in Fair Condition.

~~L42084 00070.030~~ (USRS Main Canal) Quales & Kaufmann

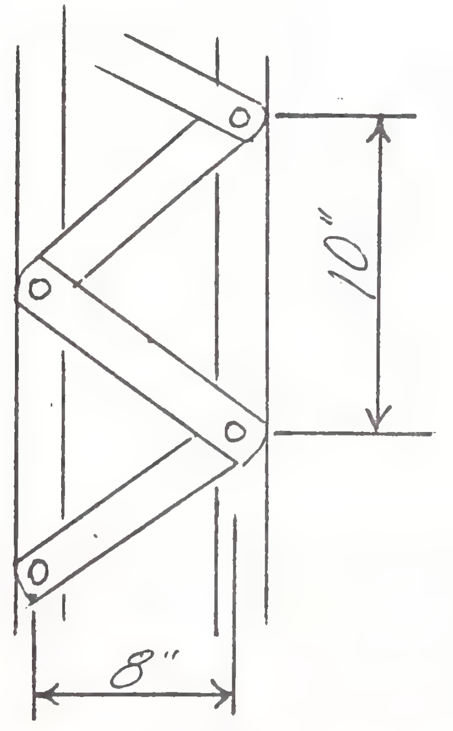
str. Measurements: L42 245-0.1 sheet 1 of 3



From Center of upstream Truss to Center of downstream Truss = 19'-0'



End Posts & top chord
($L_0 U_1$; $U_1 U_2$; $U_2 L_3$).



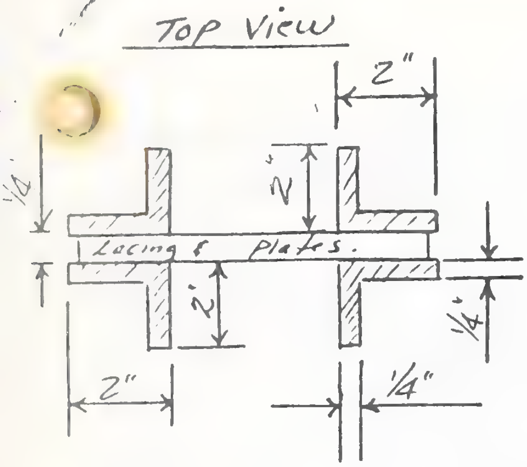
(Bottom side)
~~1/8~~ 1/4" x 1 1/2" strapping

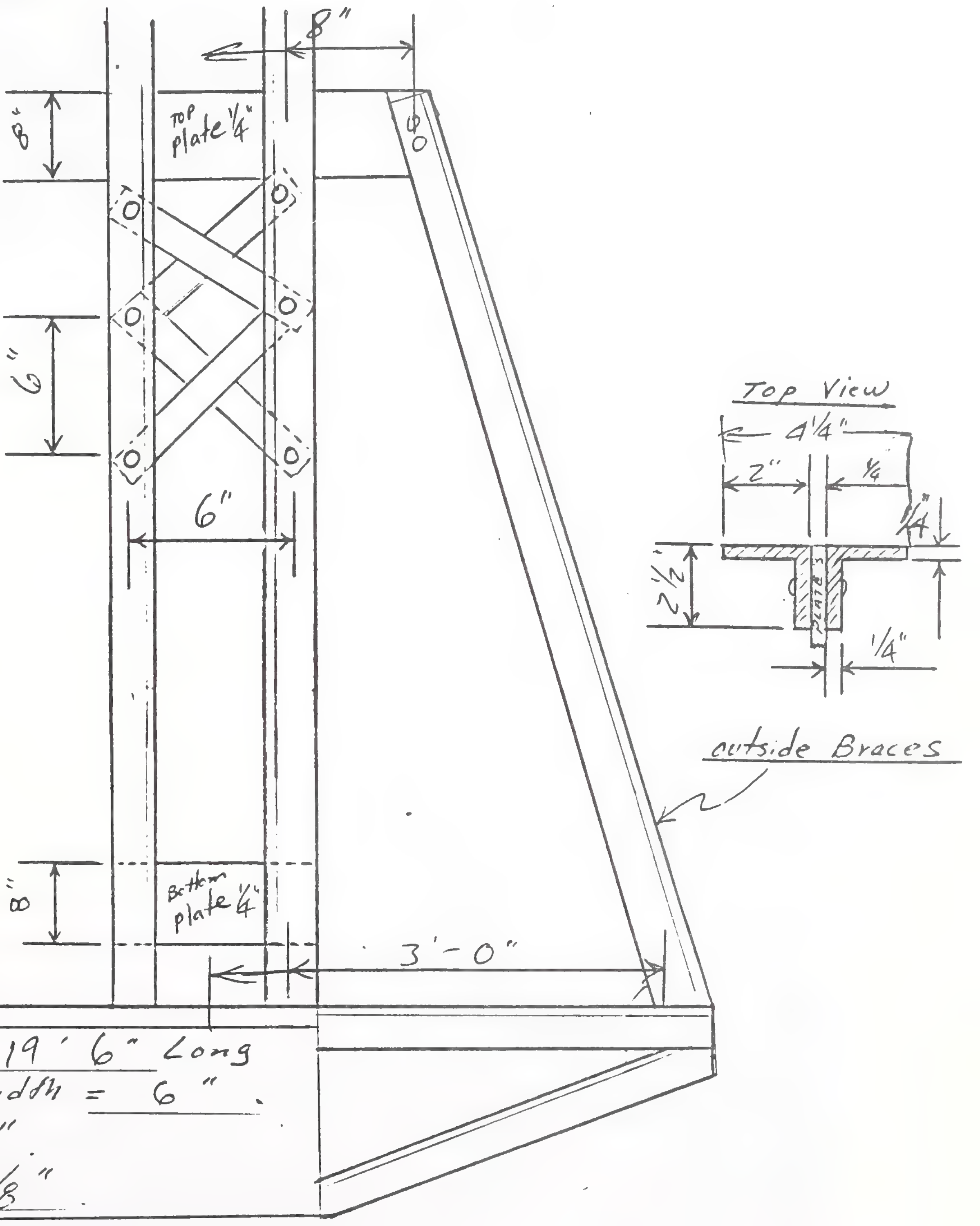
Lower Chord & Diagonals
($L_0 L_1$; $L_1 L_2$; $L_2 L_3$) 2- eye bars 5/8" x 2".
($U_1 L_2$) one 1" Dia. Rod
($U_2 L_1$) one 1" Dia. Rod

~~X420E4 000+0.0~~30 (USRS Main Canal)

sheet 2 of 3

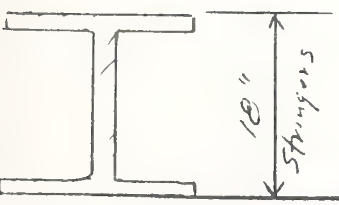
" X-Lacing between Top & Bottom plates





1/4 "x1 1/2" strapping

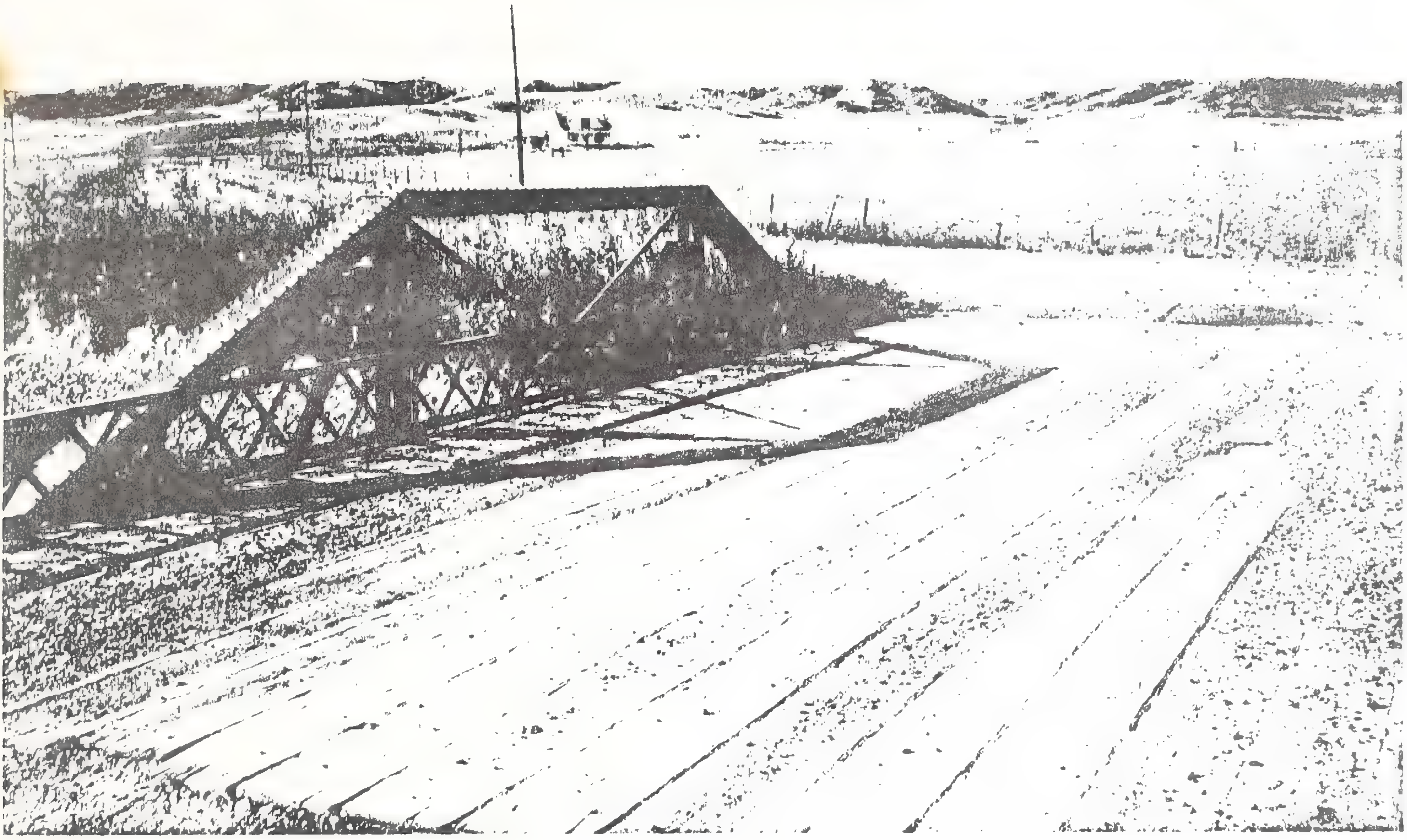
No. of X's. = 4

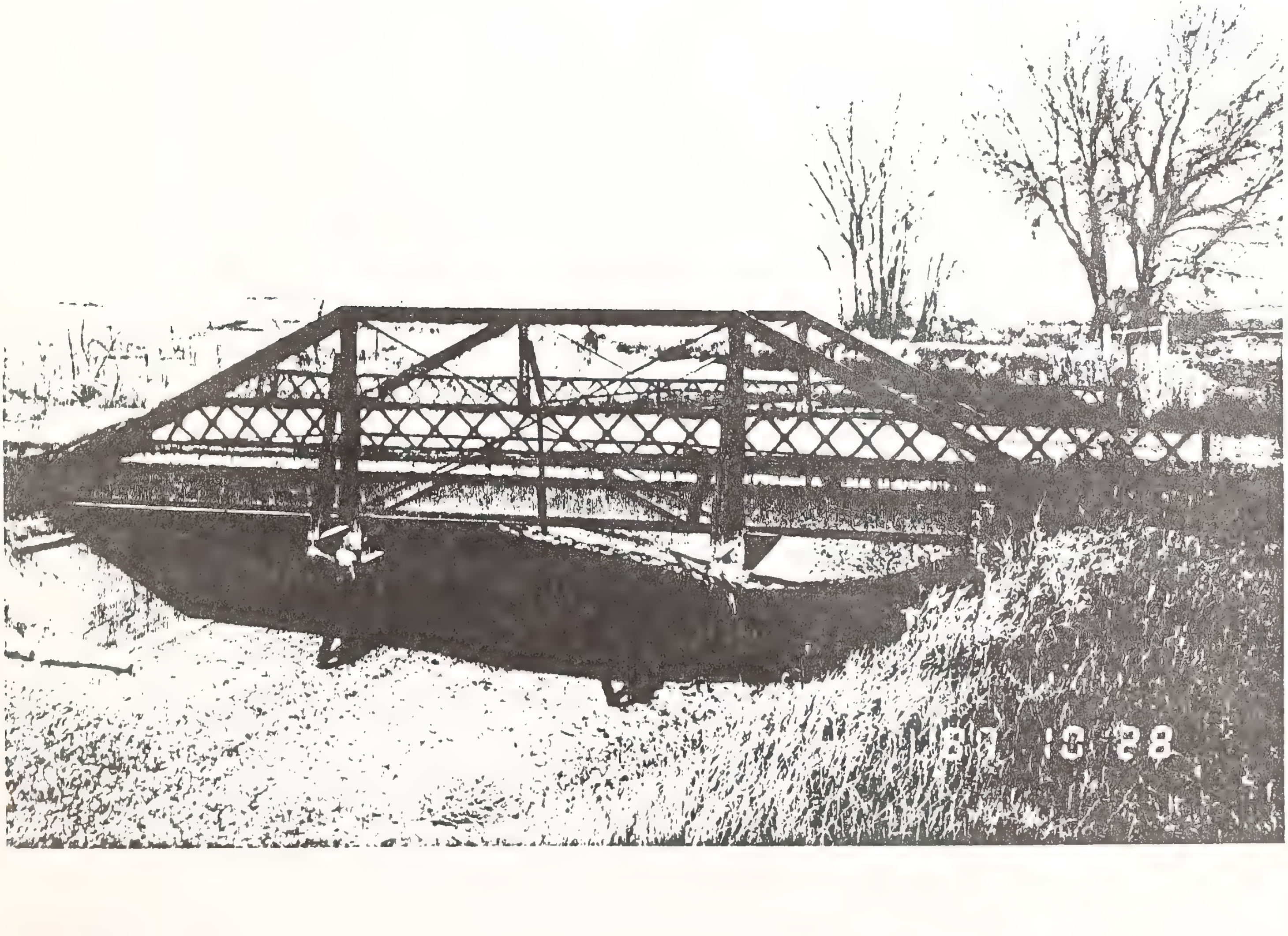


Floor Beam: I-Beam 19' 6" Long
Depth = 18", Flange width = 6".
web Thickness = 1/2".
Flange Thickness = 5/8".

Vertical Members & outside Bracing

$(V_1 L_1;\ V_2 L_2)$:

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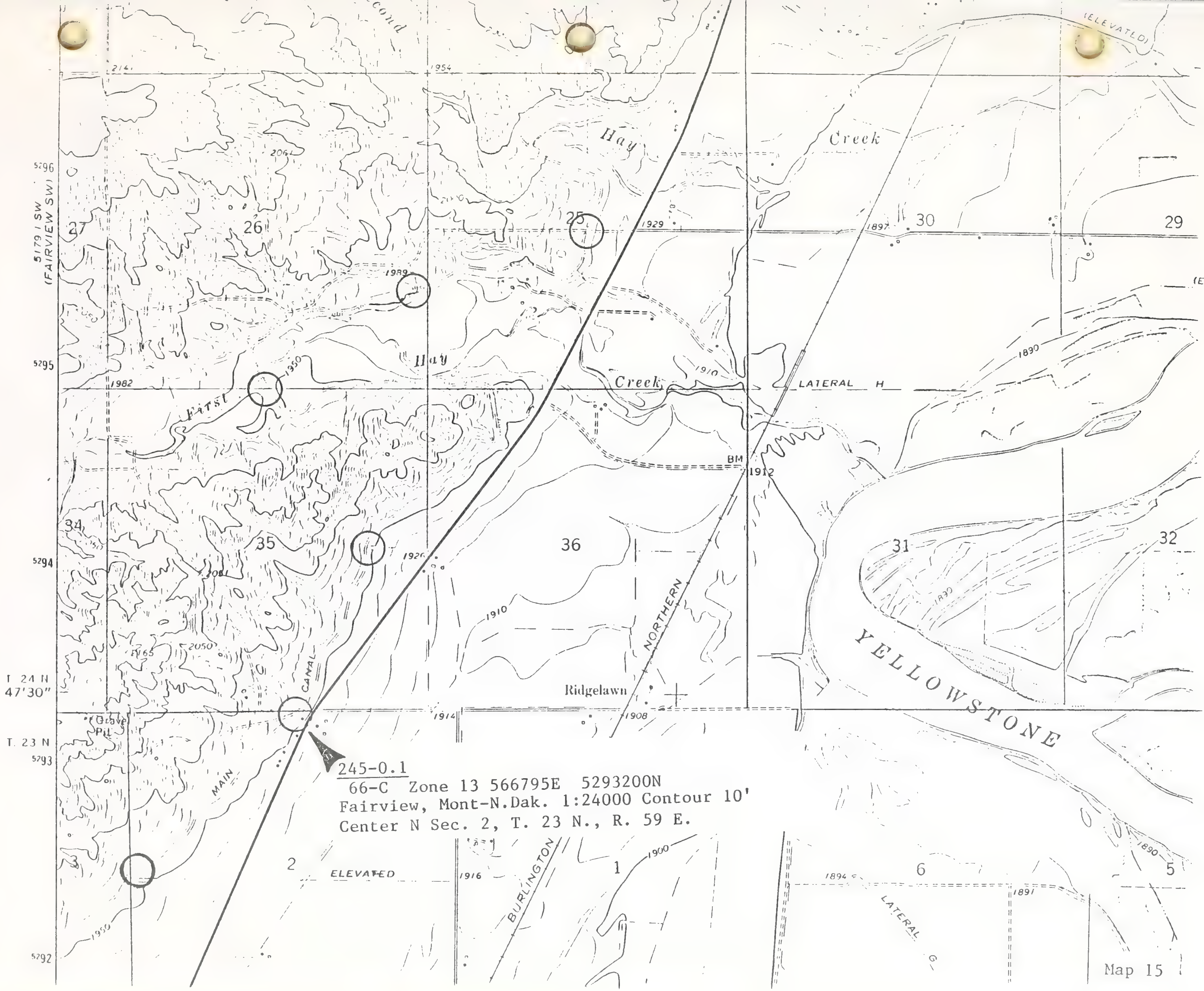


245-0.1
66-C Zone 13 566795E 5293200N
Fairview, Mont-N.Dak. 1:24000 Contour 10'
Center N Sec. 2, T. 23 N., R. 59 E.

Map 15

MONTANA BRIDGE INVENTORY FORM

Site Number: *24 RL 178* Site Name: *USRS Canal Bridge*
5 Mi. S.W. Fairview
Structure Number: *L42 564 000+0.300-1 069-C* Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *SW¼SE¼NE¼, Sec. 35 T. 24 N. R. 59 E.*
UTM Zone: *13, 567090 E. 5294055 N.*
Quad Name: *Fairview, Montana - North Dakota* Scale: *1:24,000*
County/City: *Richland* Route *564* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City _ Federal _X_ Private __ Tribal __
Specify Bureau of Reclamation

PRESENT USE: *USRS Main Canal Bridge, Agricultural Access*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
_X Truss
  _X Pin connected
  __ Rigid

MATERIALS

__ Wood
_X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
_X Pony (wood plank deck)
__ Through
__ Combination

TRUSS DESIGN

__ King Post
_X Queen Post
__ Howe
__ Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
  __ K
__ Other

Length *38'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A. P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*

Builder/Contractor *A. Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 4, Frames 6 and 7.

NARRATIVE DESCRIPTION

This single span, pin-connected steel Queen Post pony truss is 38' long, including 3 panels of 12'8" each. It is nearly 18 feet wide and 6 feet tall. The bottom chord is forged steel eyebars, and the top chord is continuous plate riveted to 2 channel sections that are laced along the bottom flanges. Verticals are composed of 4 latticed angle sections. Knee braces are riveted to the floor beam, and rise to the upper vertical where they are riveted in place with an 8" plate. Diagonals are eyebars with turnbuckles. Angle braces are in place to hold the guardrail, but it is missing. Its loss greatly alters the appearance of the bridge.

NARRATIVE HISTORY

Station 2655, the location of this bridge, was originally planned as a 38' x 9' combination wood and steel truss, then changed to a 38' light steel truss. It sees only local landowner use now, as there is no access except from the road along the canal itself.

INTEGRITY *Poor. The guardrail is completely missing. Sufficiency was rated at 38.6 in 1986.*

Altered *X* Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

The bridge is historically significant as one of the USRS Canal bridges, but it has lost integrity of design since its guardrail is missing.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 25, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Canal and road construction and field leveling have significantly altered the ground surface.*

Was historical/architectural survey conducted around the structure?

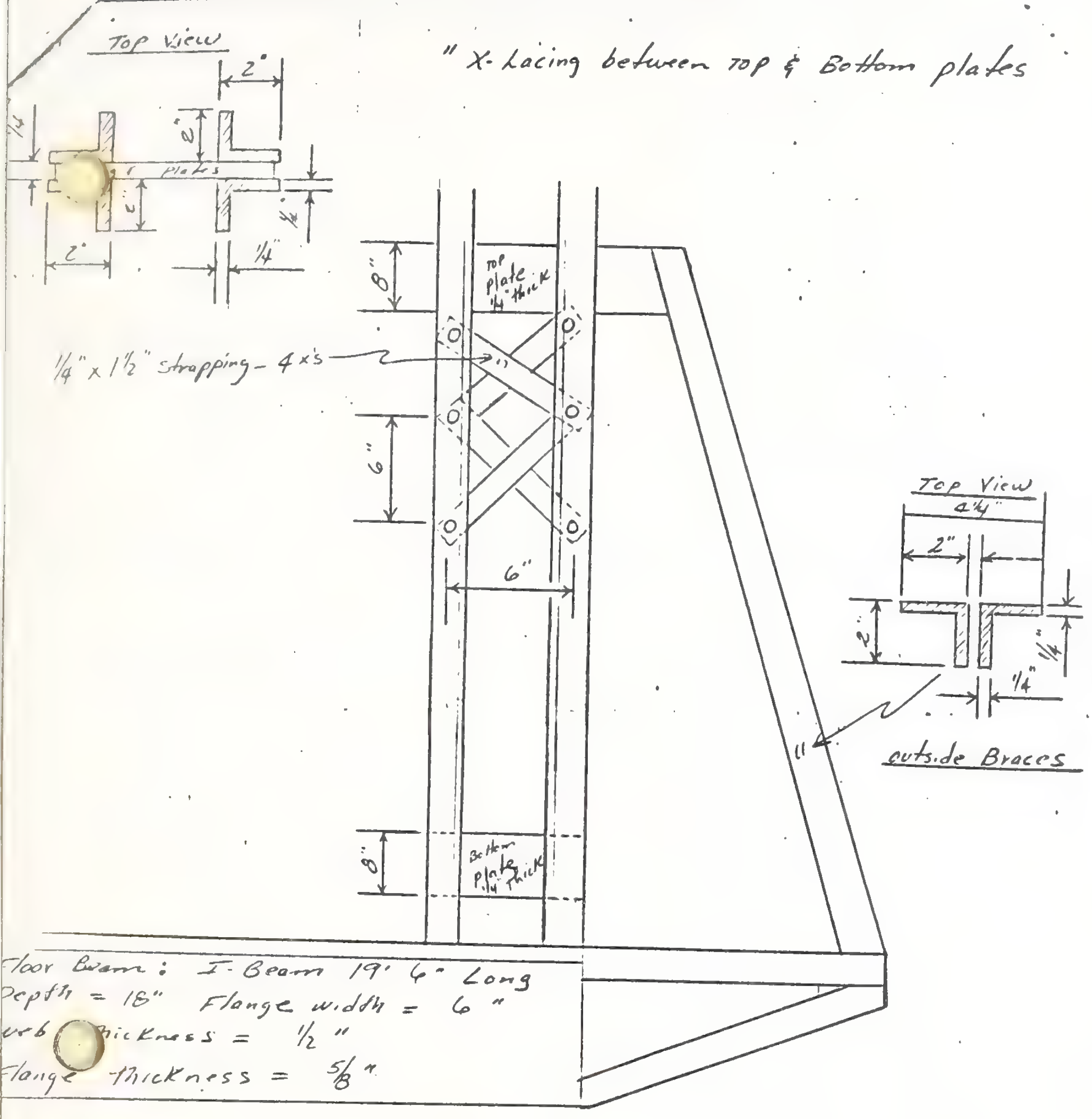
Yes _X_ No __

Results negative _X_

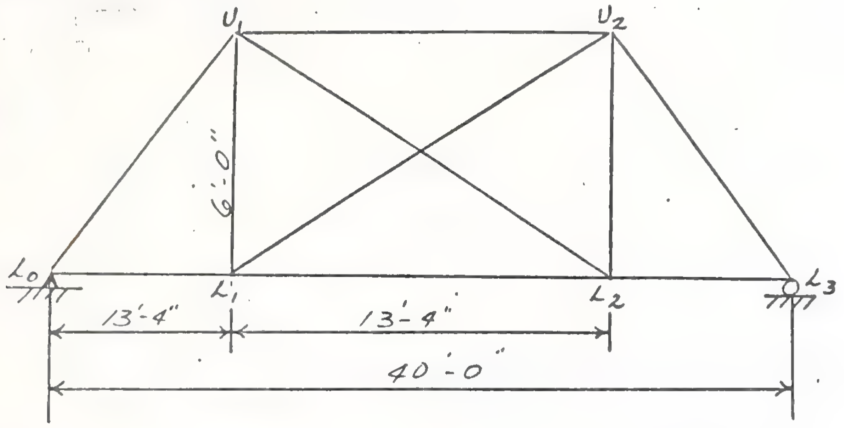
Comments: *No properties are in the vicinity.*

EV:3:mb:248/p

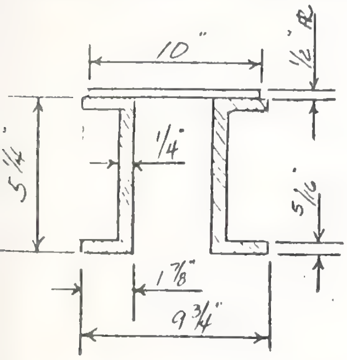
42.564 000+0.3001 · USRS Main Canal



Vertical Members & outside Bracing

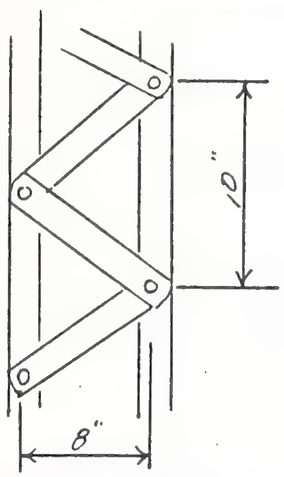


From Center of upstream Truss to Center of downstream Truss = 19'-0"



End Posts & Top chord

($L_0 U_1$; $U_1 U_2$; $U_2 L_3$).



(Bottom side)
1/4" X 1 1/2" strapping

Lower Chord & Diagonals

($L_0 L_1$; $L_1 L_2$; $L_2 L_3$) 2- eye bars 5/8" x 2 1/2".

($U_1 L_2$) — 1" Square Rod

($U_2 L_1$) — 1" Square Rod

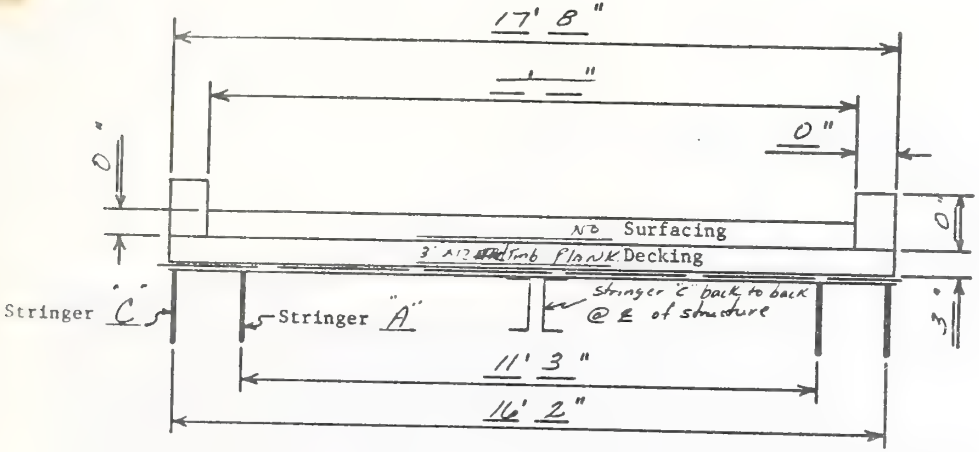
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number L42.564 00010.3001 Span(s) 1

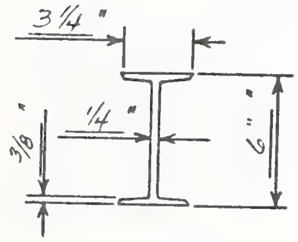
Inspector K.Q.

Date 10-12-84

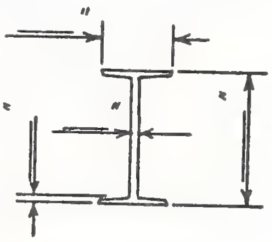

17' 8"
' "
0"
0"
0'
NO Surfacing
3" x12 Timb Plank Decking
Stringer "C"
Stringer "A"
Stringer "C" back to back @ ℄ of structure
3"
11' 3"
16' 2"

10 Stringers (total)

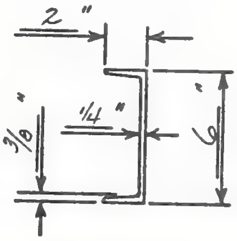
Span Length 40' 0"



STRINGER "A"



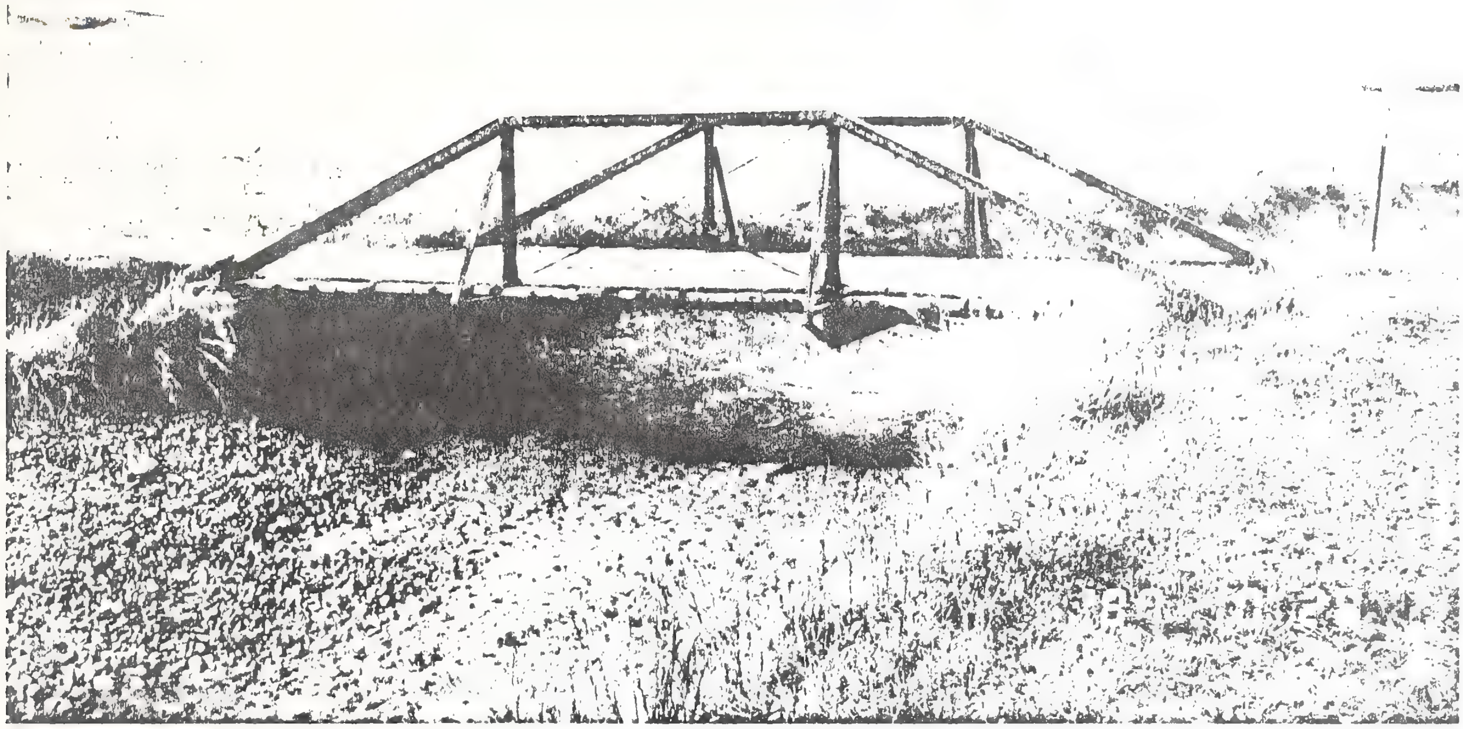
STRINGER "B"

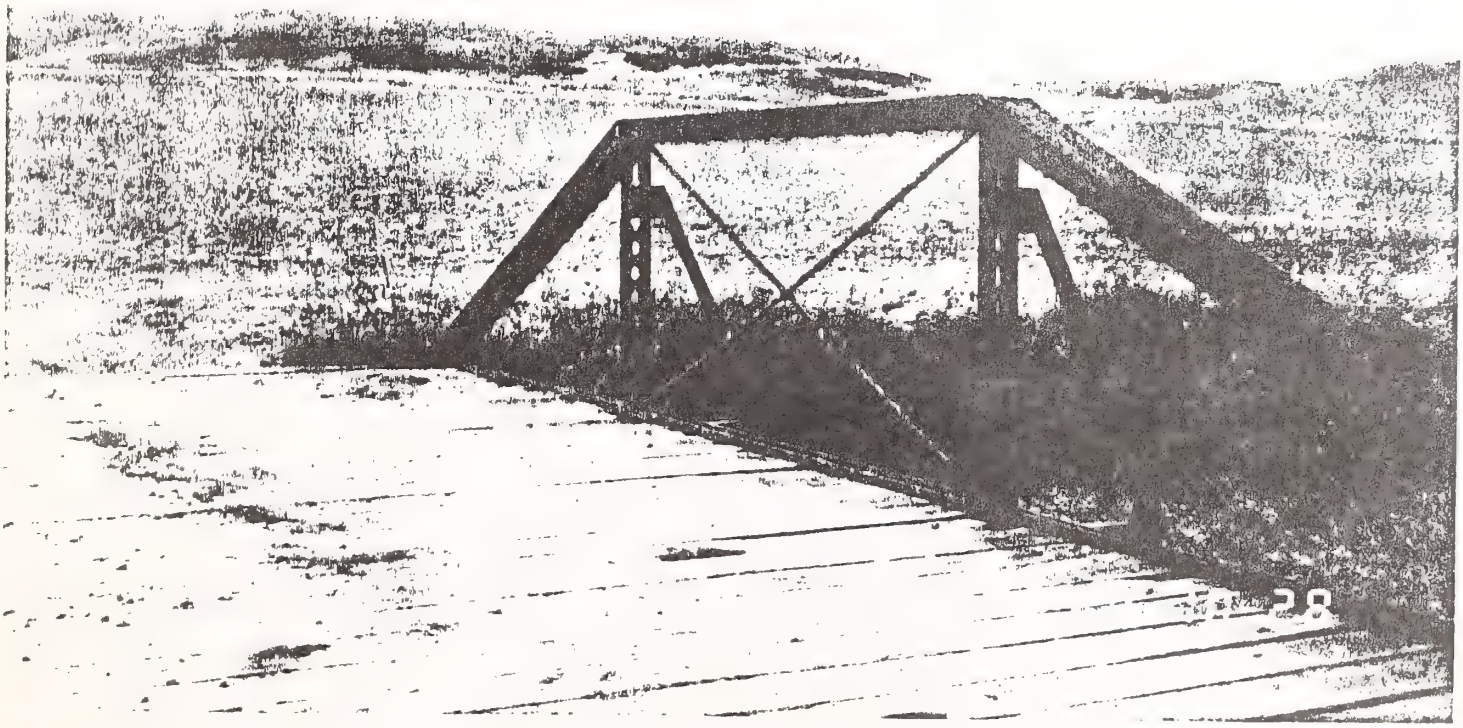


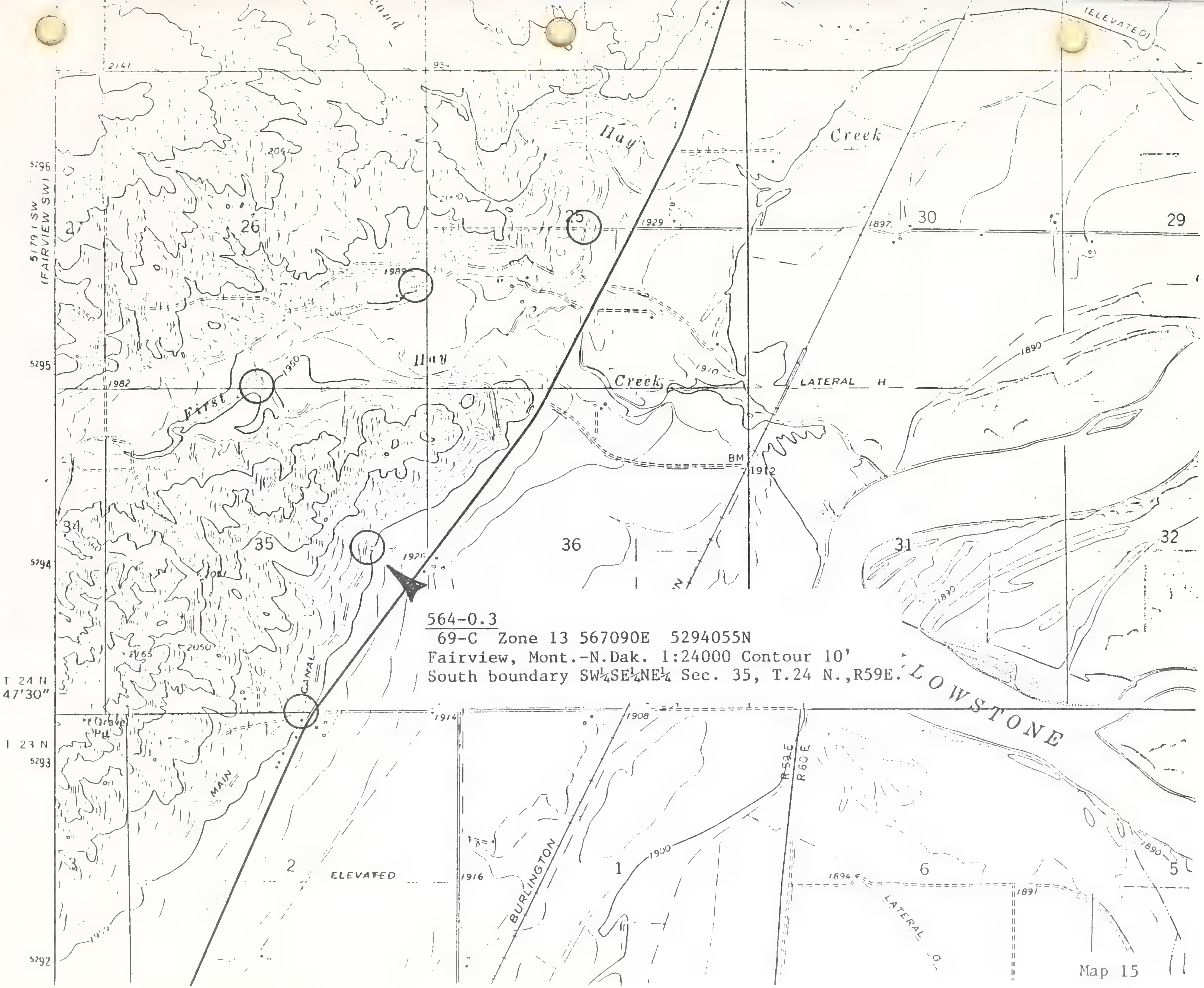
STRINGER "C"

Comments: Dbl. channels @ ℄ of Str., stringers are in fair Condition (light Rust). See photo for floor beams connection to stringers.

Ken Neale Insp.




28



564-0.3
69-C Zone 13 567090E 5294055N
Fairview, Mont.-N.Dak. 1:24000 Contour 10'
South boundary SW¼SE¼NE¼ Sec. 35, T.24 N.,R59E.

Map 15

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL179* Site Name: *USRS Canal Bridge - Candee Farm*
Structure Number: Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *SE¼SE¼SW¼, Sec. 26 T. 24 N., R. 59 E.*
UTM Zone: *13, 566560 E. 5294860 N.*
Quad Name: *Fairview, Montana - North Dakota* Scale: *1:24,000*
County/City: *Richland* Route Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City __ Federal __ Private X Tribal __
Specify Gaery Candee, Candee Angus Farm, Fairview, Montana

PRESENT USE: *Private access to irrigated acreage and an oil well west of the canal.*

BASIC BRIDGE (check as appropriate)

- __ Beam, Slab, Girder
- __ Suspension
- __ Arch
- __ Movable
- X Truss
  - X Pin connected
  - __ Rigid

MATERIALS

- __ Wood
- X Metal
- __ Combination
- __ Stone
- __ Reinforced Concrete
- __ Prestressed Concrete

TYPE

- __ Deck
- X Pony
- __ Through
- __ Combination

TRUSS DESIGN

- __ King Post
- X Queen Post
- __ Howe
- __ Pratt
  - __ Double Intersection
  - __ Half Hip
  - __ Parker
  - __ Camelback
  - __ Pennsylvania (Petit)
    - __ Sub Struts
    - __ Sub Ties
  - __ Baltimore
- __ Lenticular
- __ Warren
  - __ Verticles
  - __ Polygonal Chord
  - __ Double Intersecting
  - __ Quadrangular
  - __ K
- __ Other

Length *48'* Width *17½'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers Type
Designer/Engineer *U.S. Reclamation Service, A. P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A. Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 4, Frames 8, 9 and 10.

NARRATIVE DESCRIPTION

This is a single span, pin-connected, steel Queen Post Pony truss, measuring 48' long. It is composed of three panels 16' each, 7' high, and 17½' wide deck. The lower chord is forged steel eyebars, while the upper chord is continuous steel plate riveted to 2 channel section sthat are laced along the bottom flanges. The verticals are 4 latticed angle sections. Knee braces of double angles are riveted to the bottom floor beam, and rise to the upper vertical where they are attached with an 8" plate. Eyebars with turnbuckles serve as counters. A latticed guardrail of 2 angle sections extends to the end on either side. It is dented but otherwise intact. The deck is plank with running boards.

NARRATIVE HISTORY

Station 2342 was first scheduled for a combination steel and wood truss, then was changed to get a 48' light truss. Only one was ordered this size, according to the bid sheet. In 1983 the bridge was replaced, as it was situated in a location that received considerable local traffic (204-1.7 54-C). It was stockpiled, then moved here for reuse. Originally a 38' USRS truss was located here. When it was removed is unknown, but it could be the next one down canal now located at the Candee Ranch buildings. One of the old abutments was used for the present bridge, but since this one is longer, another had to be built.

INTEGRITY *Good, but loss of original setting.*

Altered Unaltered *X* Moved *Yes* Date *1985*
Summary of Move: *In 1983 the bridge at Station 2342, a light 48' steel truss, was replaced by a 48' concrete Tee Beam. The A. Y. Bayne steel truss was sold to the Candee Angus Farm, and delivered by the county to this site two years later for a fee of $250. (It was formerly 204-1.7 54-C).*

SIGNIFICANCE

The bridge has historic value as one of the USRS Main Canal bridges, but has been moved in recent times, rendering it ineligible for listing on the National Register of Historic Places.

PROPOSED IMPACTS/RECOMMENDATIONS

None.

Site Recorded By: *Edrie Vinson* Date: *January 25, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes _X_ No __

Results negative _X_

Comments: *Surface disturbance from road and canal construction and from leveling fields for irrigation, precluded possible discovery of intact archaeological resources.*

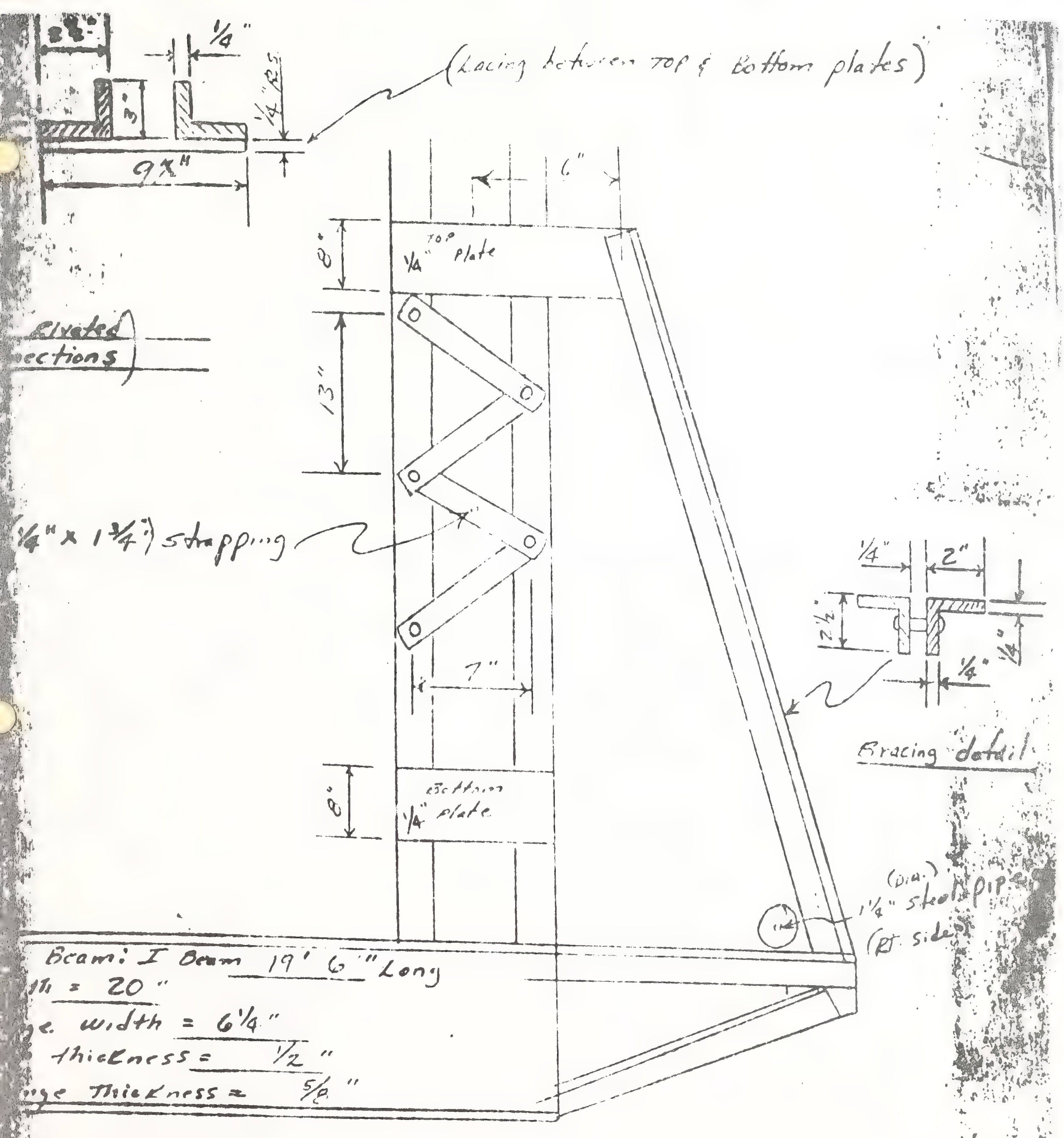
Was historical/architectural survey conducted around the structure?

Yes _X_ No __

Results negative _X_

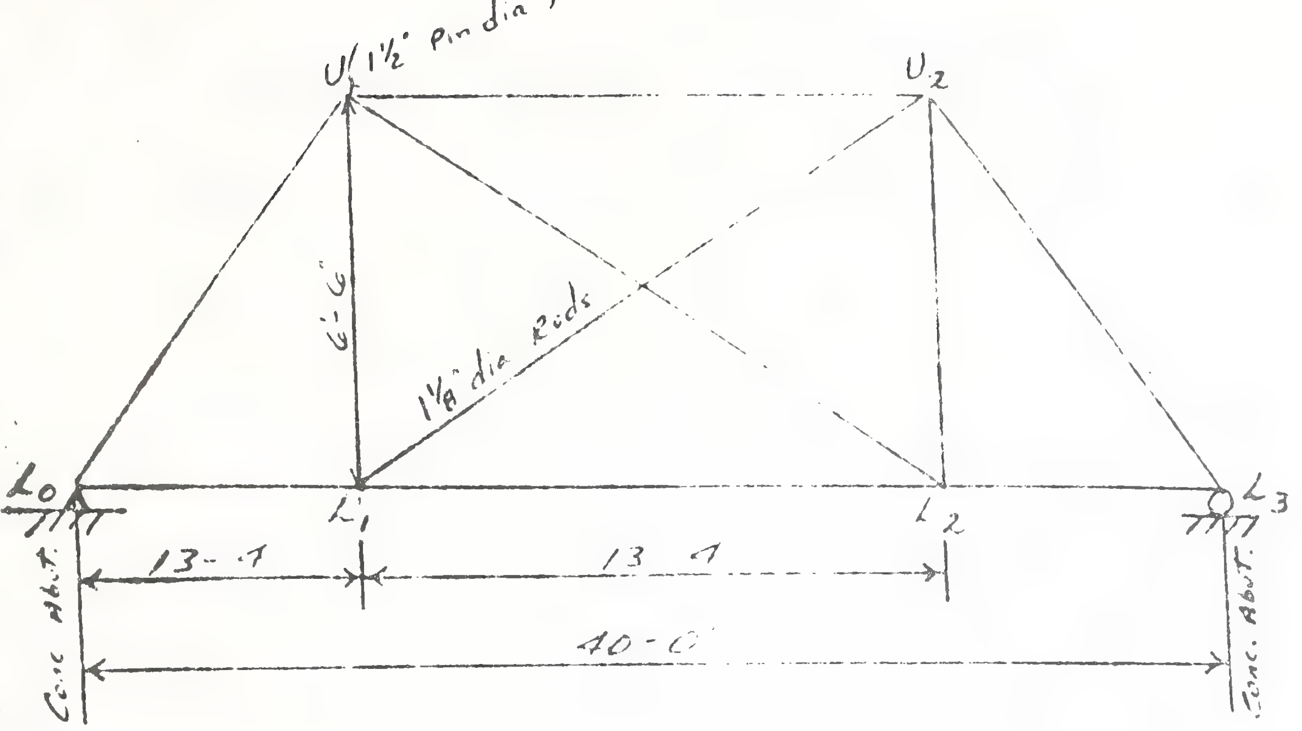
Comments: *There are no properties in the vicinity.*

EV:1:mb:255/e

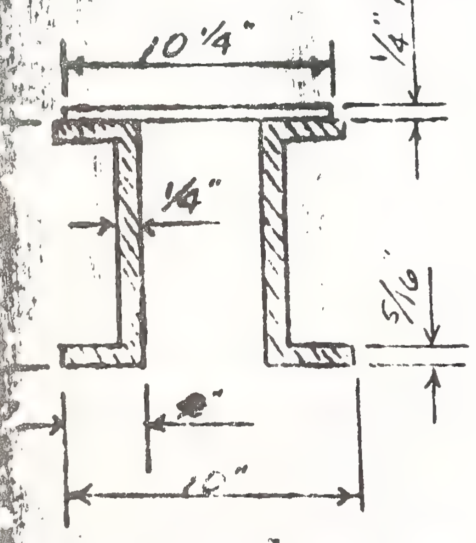


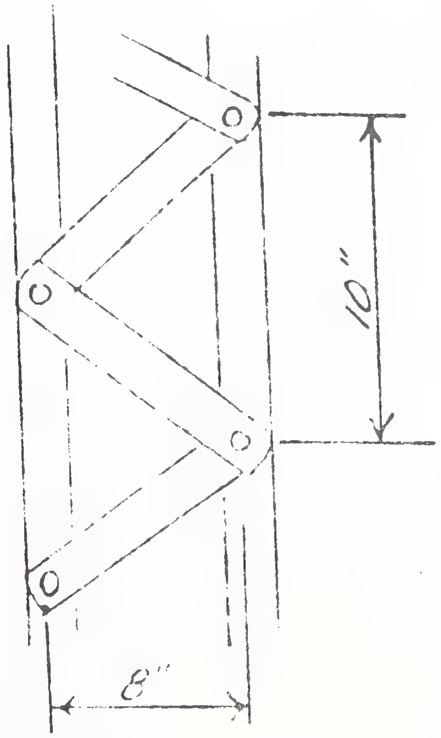
Beam: I Beam 19' 6" Long
th = 20"
ge. width = 6¼"
thickness = ½"
nge Thickness = 5/8"

Vertical Members & outside Bracing.



om Center of upstream Truss to Center of downstream Truss = 18'-10¼"





(Bottom side)
(¼" x 1¾" strapping)

nd Posts & Top Chord

$(L_0 U_1; U_1 U_2; U_2 L_3)$.

iveted Connections)

ower Chord & Diagonals

$L_1; L_1 L_2; L_2 L_3)$ 2-eye bars (¾" x 2½")

L_2)
L_1) } 1⅛"(dia) Rods

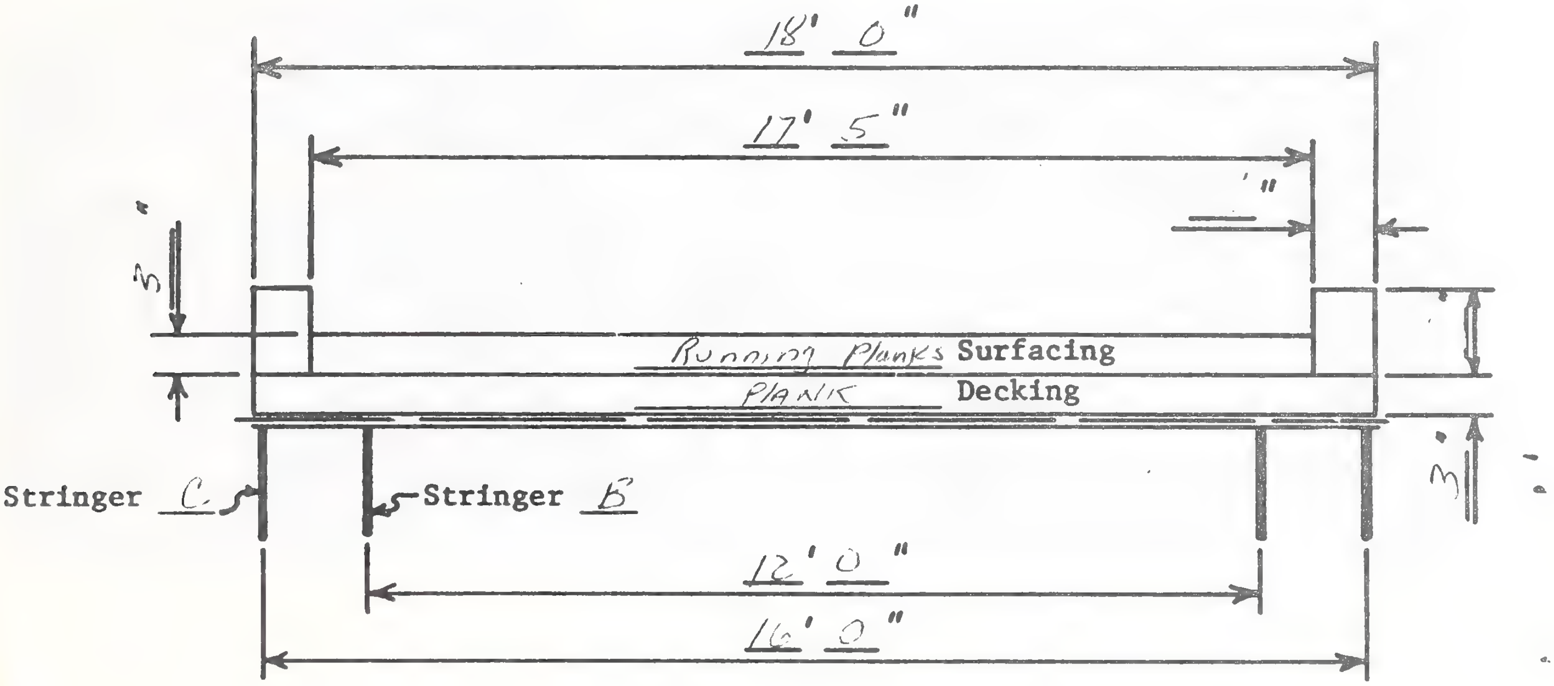
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet ____ of ____

Structure Number L42 ? - 00040.900 Span(s) 1

Inspector CB

Date 1/8/88



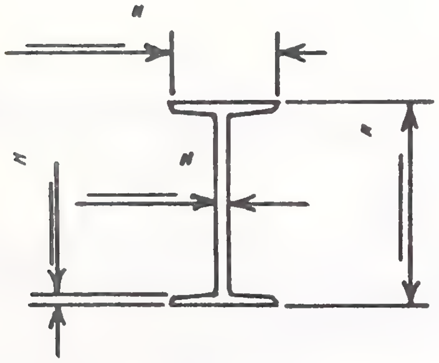
Running Planks Surfacing

PLANK Decking

Stringer C

Stringer B

11 Stringers (total) Span Length 40' 0"



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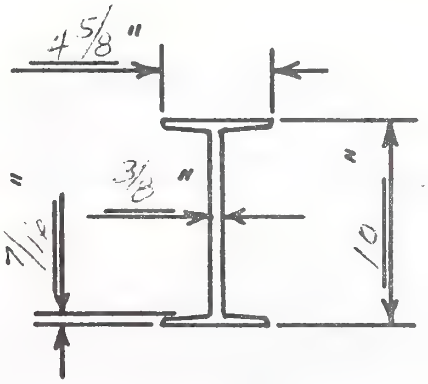

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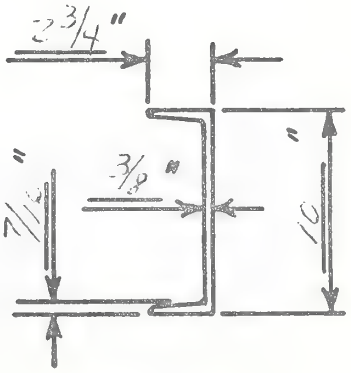
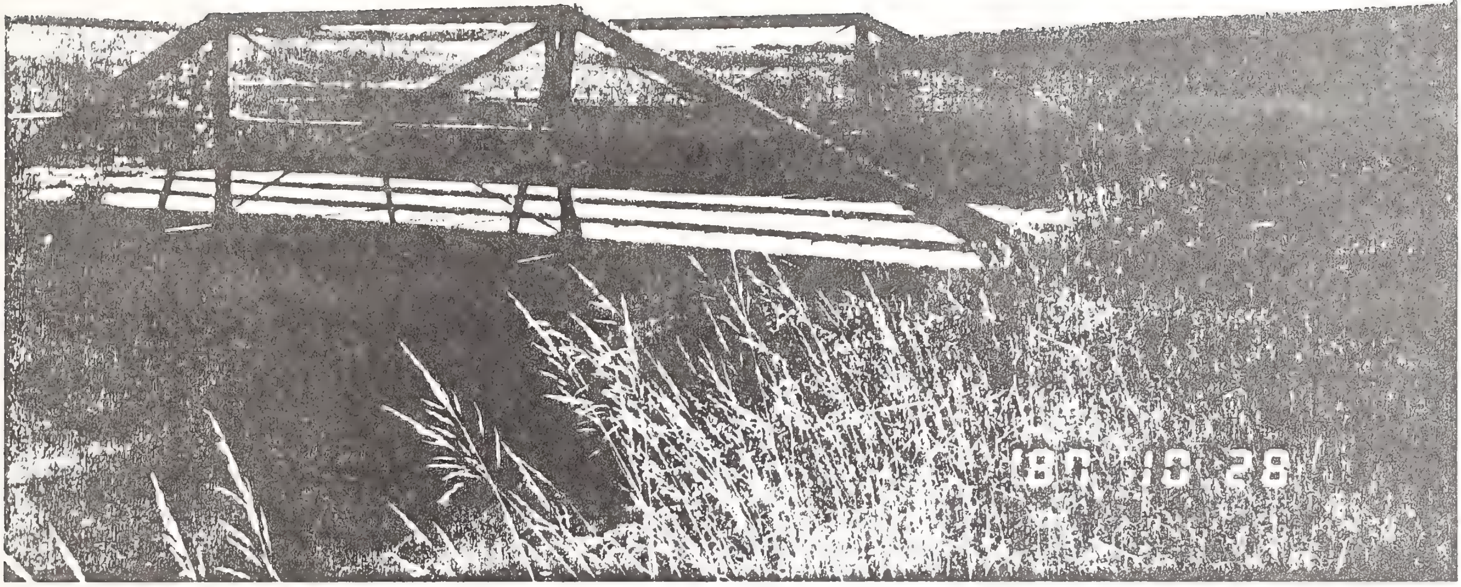
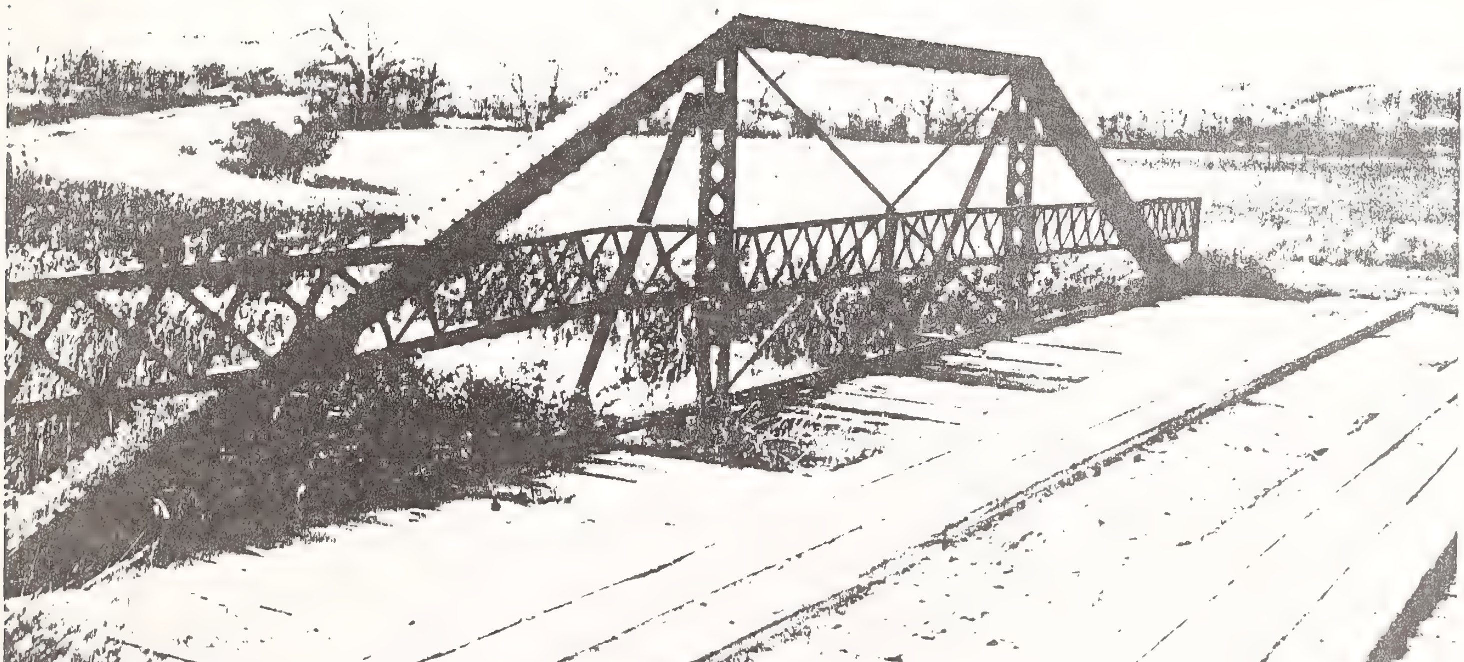


STRINGER "C"

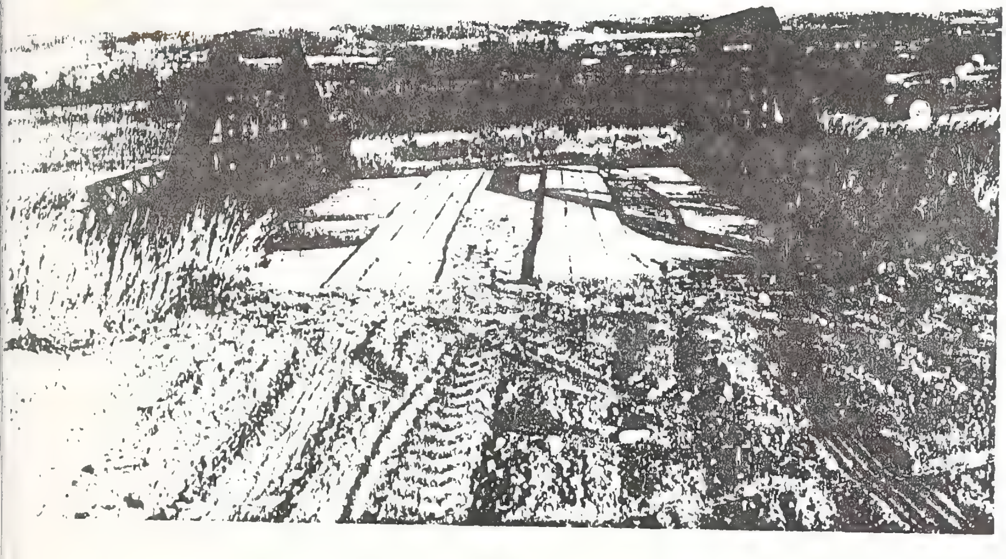
Comments:


'87 10 28



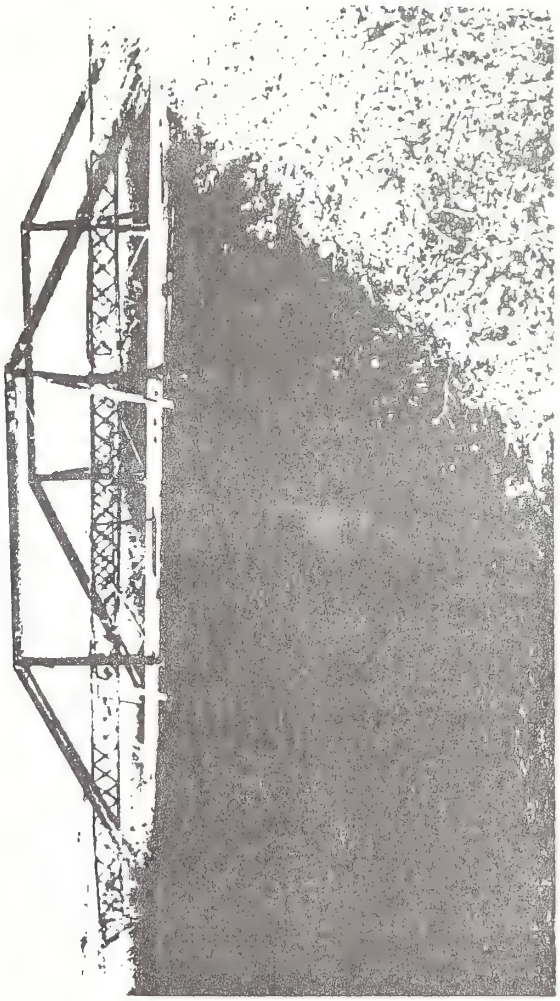
8-88

Looking North
USRS Main Canal



West Down Strea,
USRS Main Canal

1-8-88

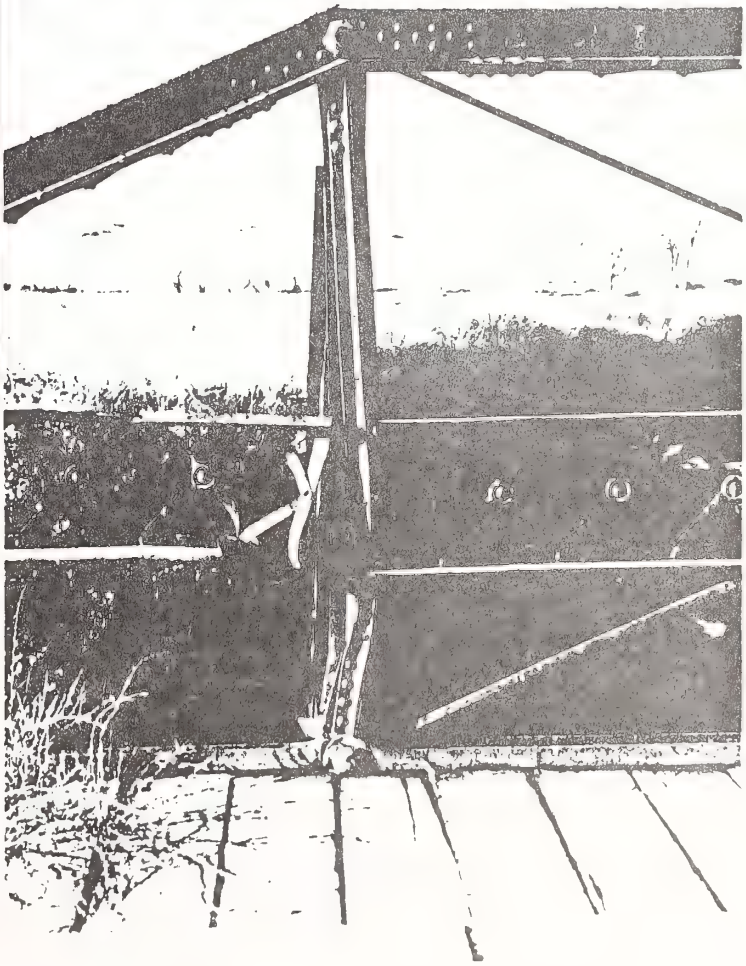


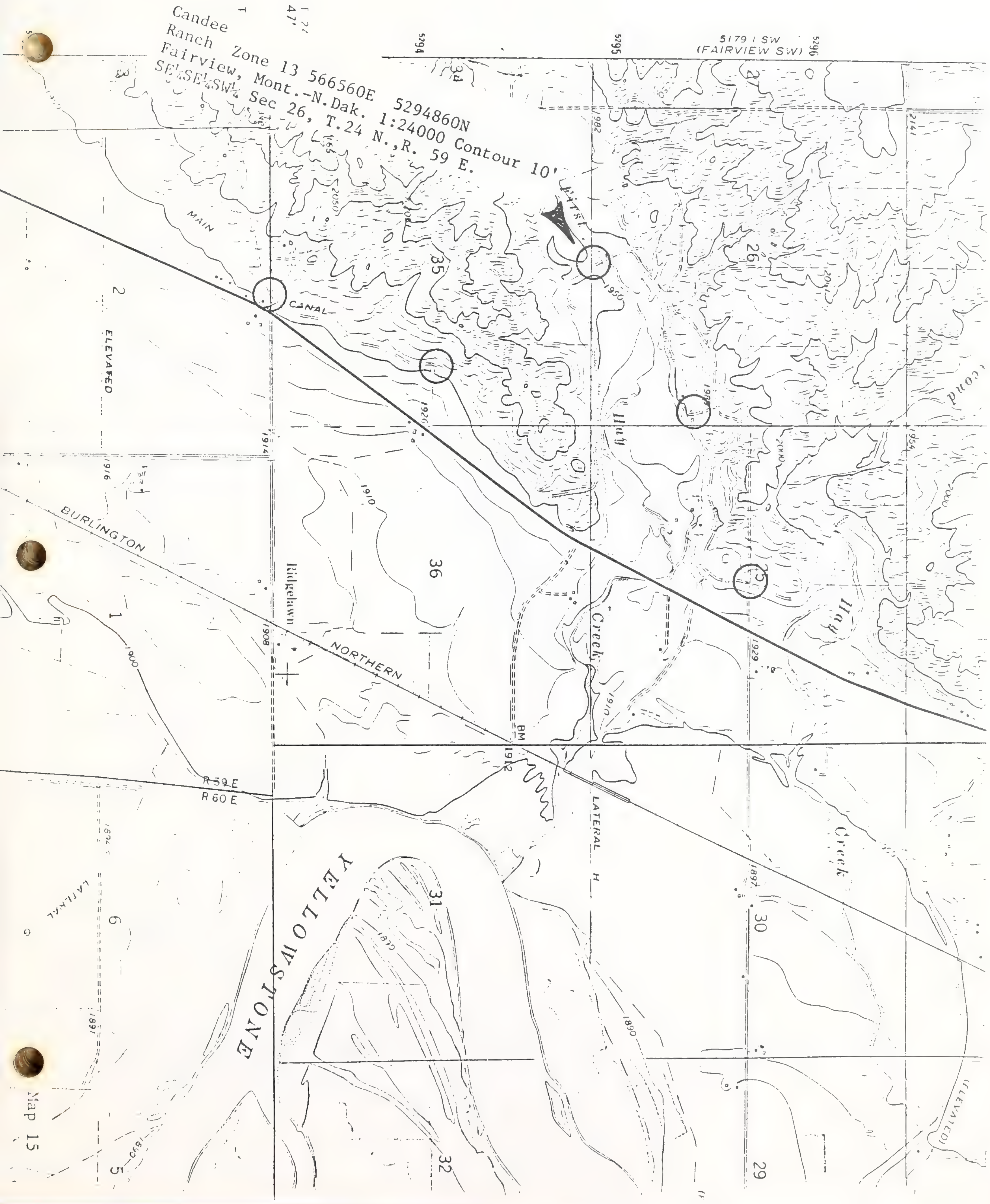
-8-88

RT. Vertical

1-8-88

Left Vertical





Candee
Ranch Zone 13 566560E 5294860N
Fairview, Mont.-N.Dak. 1:24000 Contour 10'
SE¼SE¼SW¼ Sec 26, T.24 N., R. 59 E.

Map 15

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL180* Site Name: *USRS Main Canal, 4 Mi. SW Fairview*
Structure Number: *L42 562 000+0.900-1 072-C* Year Built: *1908*
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *SE¼NE¼SE¼, Sec. 26 T. 24 N., R. 59 E.*
UTM Zone: *13, 567300 E. 5295370 N.*
Quad Name: *Fairview, Mont. - N. Dak.* Scale: *1:24,000*
County/City: *Richland* Route *562* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City _X_ Federal __ Private __ Tribal __
Specify Richland

PRESENT USE: *Main Canal bridge at the Candee farm complex on a county road that ends at the ranch.*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
_X_ Truss
  _X_ Pin connected
  __ Rigid

MATERIALS

__ Wood
_X_ Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
_X_ Pony (Wood Plank and Wood Running Deck)
__ Through
__ Combination

TRUSS DESIGN

__ King Post
_X_ Queen Post
__ Howe
__ Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
__ K
__ Other

Length *38'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 4, Frames 11, 12 & 13

NARRATIVE DESCRIPTION

This single span, pin-connected Queen Post Pony steel truss is 38' long and 17.7' wide. The top chord stands 6' high. The three panels measure 12 3/4' each. The lower chord is forged steel eyebars, and the upper is continuous steel plate riveted to two channel sections that are enclosed on the bottom flanges by lacing bars. The vertical compression members are four angle sections latticed together. Knee braces are riveted to the floor beams, then rise to connect near the top of the verticals. These are composed of double angle sections. The diagonal or tension members are eyebars with turnbuckles. The deck is wood plank with a running board of plank. The lattice guardrail measures 18" between angle sections, and is bolted onto the inclined end posts and vertical members. It extends to the outer length of the bridge. It is rather beaten up from collisions with vehicles.

NARRATIVE HISTORY

Mrs. Candee, whose ranch is located on either side of the canal, remembers this bridge always being here. The county improved the road in October while the survey was underway.

INTEGRITY *Good, but the guardrails are bent. The 1986 sufficiency rating was 41.7.*

Altered *X* Unaltered Moved *Yes* Date *Many years ago.*
Summary of Move: *Details are unknown, but the move likely occurred many years ago.*

SIGNIFICANCE

As one of the original main canal bridges, this has historic significance. It's appearance is somewhat diminished by bent guardrails. It has been moved, losing integrity of location.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 25, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *In addition to canal and road construction, residential development has occurred on both sides of the canal.*

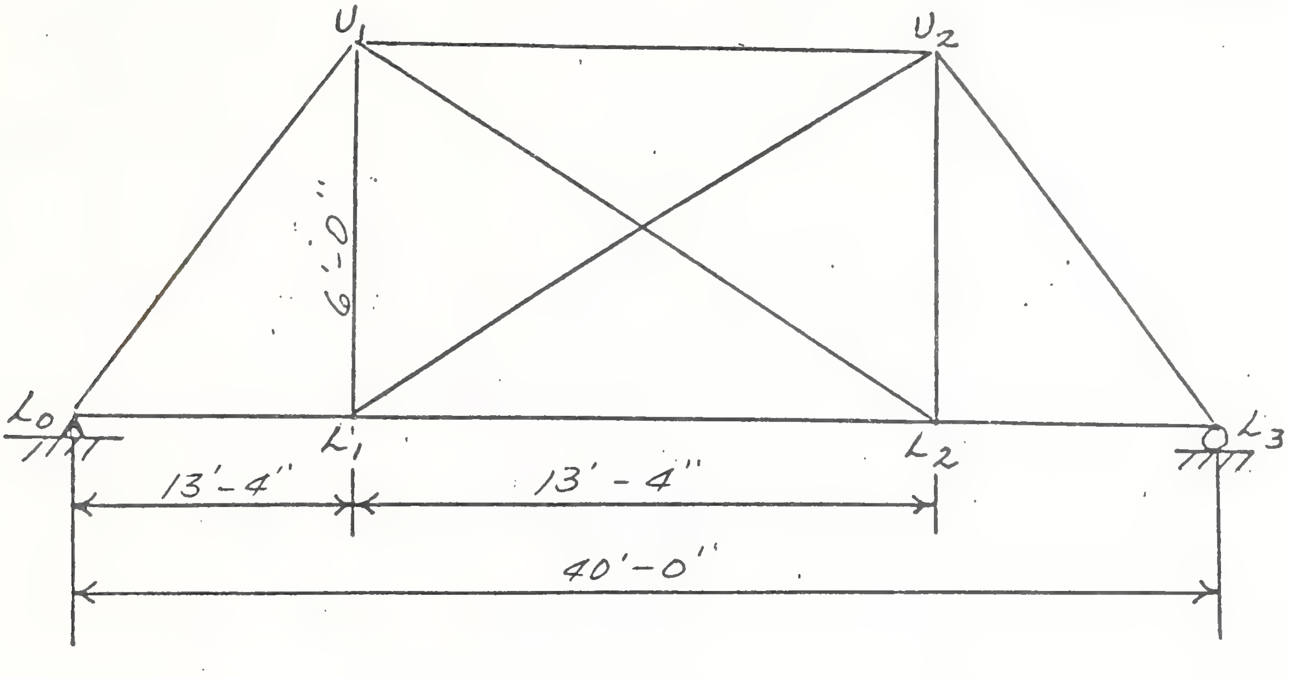
Was historical/architectural survey conducted around the structure?

Yes X No __

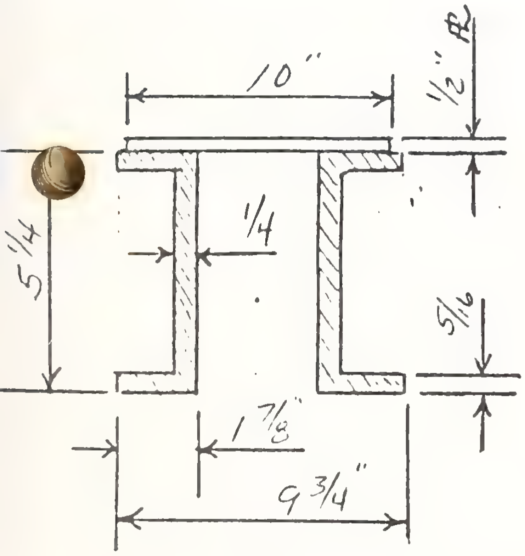
Results negative X

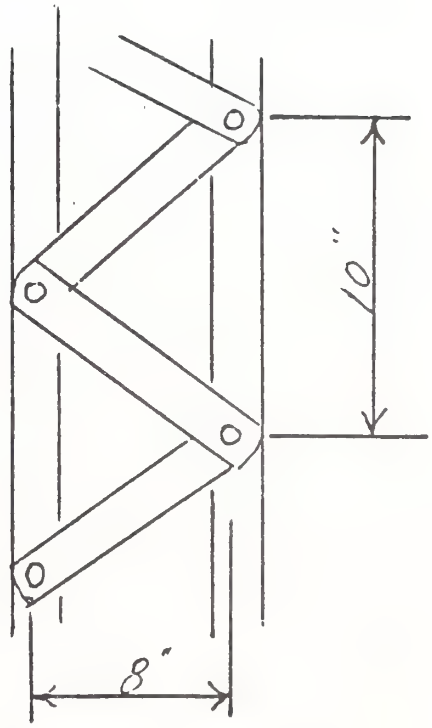
Comments: *Modern buildings, granaries, etc., date to after the 1966 USGS survey.*

EV:3:cm:248/k



From Center of upstream Truss to Center of downstream Truss = 19'-0"





End Posts & Top chord
(L_0U_1; U_1U_2; U_2L_3).

(Bottom side)
1/4" x 1 1/2" strapping

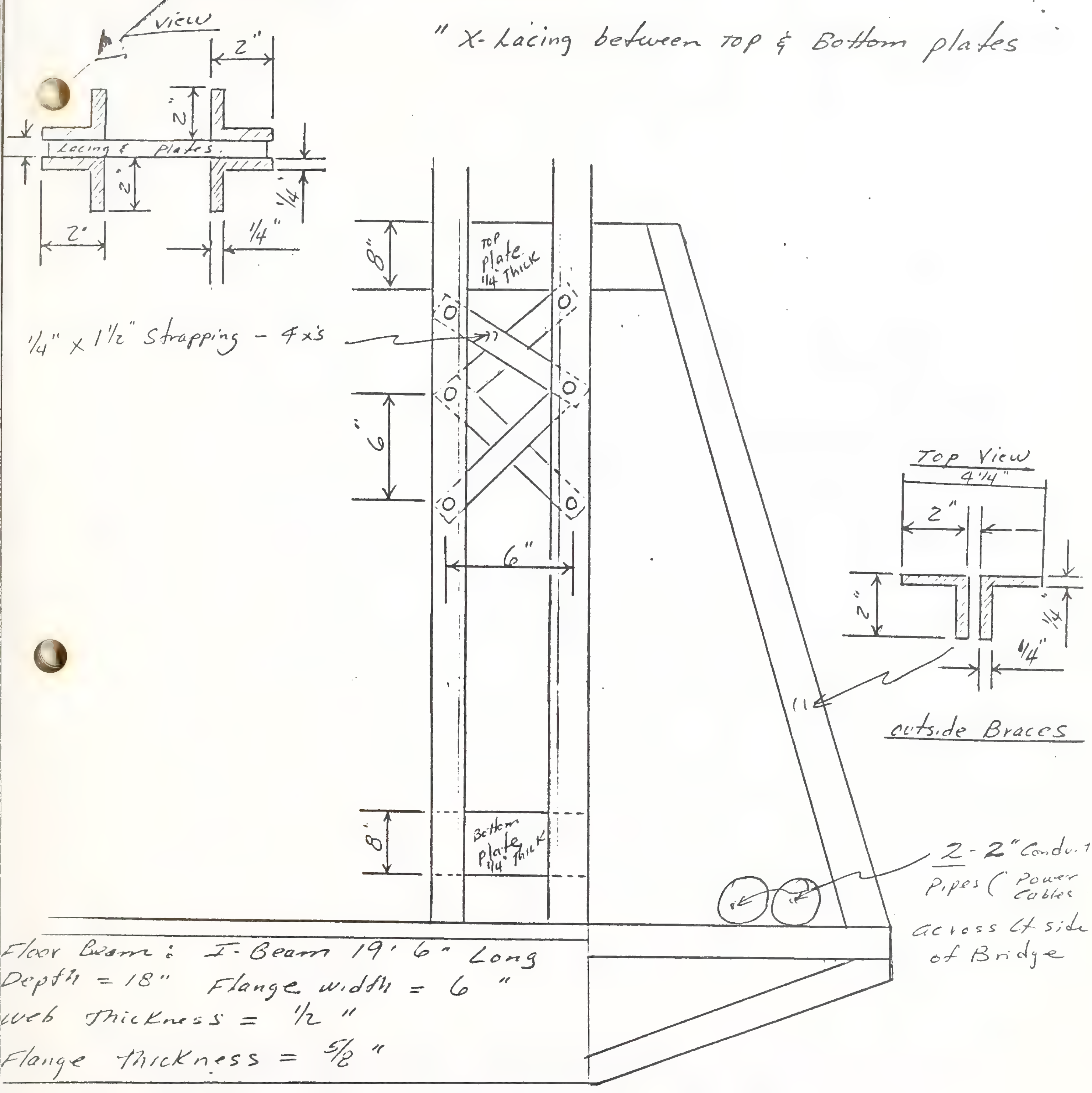
Lower Chord & Diagonals

(L_0L_1; L_1L_2; L_2L_3) 2- eye bars 5/8" x 2 1/2"

(U_1L_2) – 1" Square Rod

(U_2L_1) – 1" Square Rod

" X-Lacing between Top & Bottom plates



Floor Beam: I-Beam 19' 6" Long
Depth = 18" Flange width = 6 "
Web Thickness = 1/2 "
Flange Thickness = 5/8 "

Vertical Members & outside Bracing

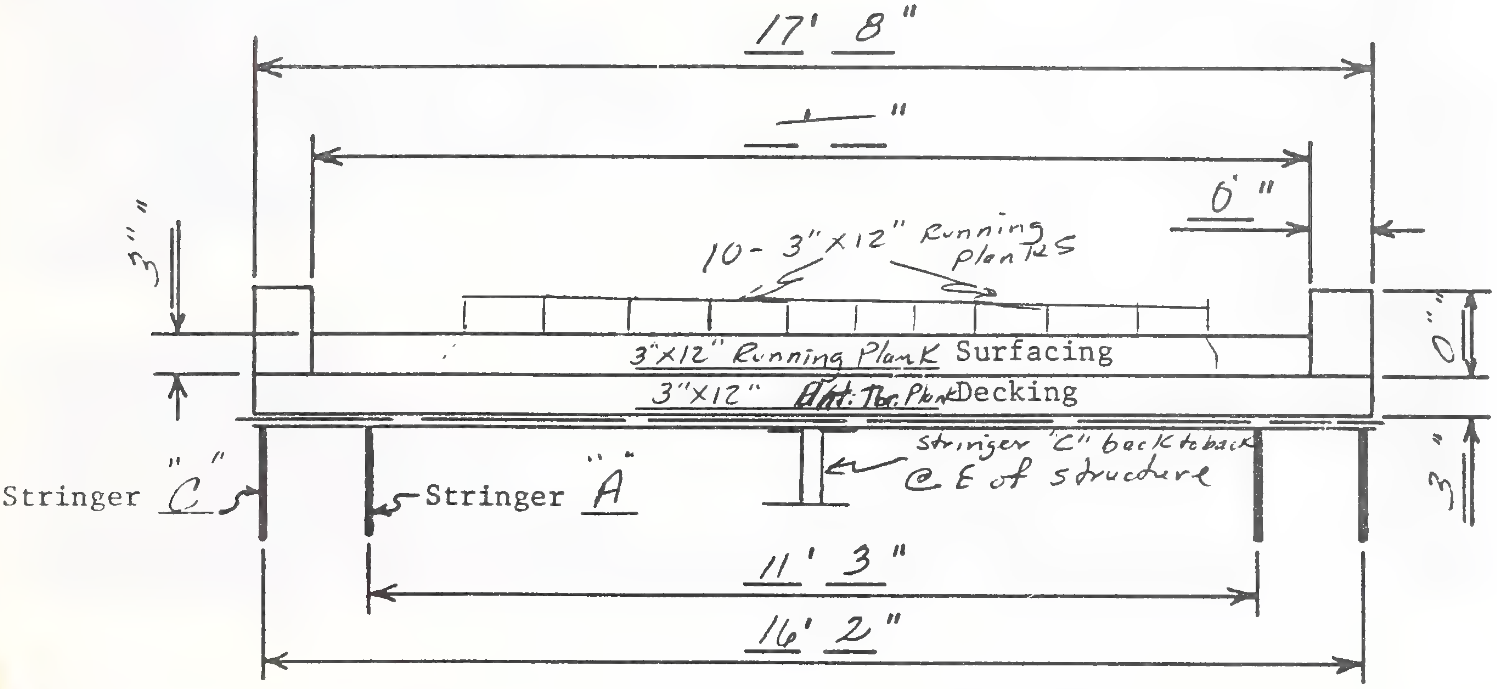
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

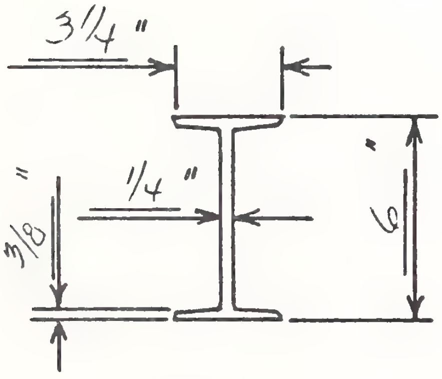
Structure Number L42563 000+0.9001 Span(s) 1

Inspector K.Q.

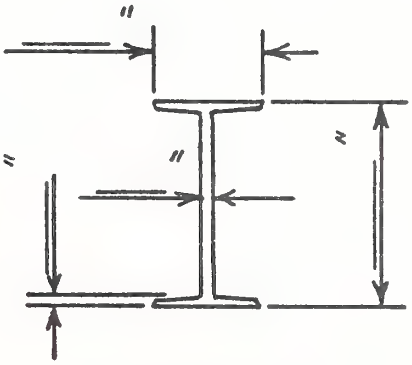
Date 10-15-84


17' 8"
' "
0' "
10- 3"x12" Running planks
3"
0"
3"x12" Running Plank Surfacing
3"x12" Hdwt. Tbr. Plank Decking
3"
stringer "C" back to back @ ℄ of structure
Stringer "C"
Stringer "A"
11' 3"
16' 2"

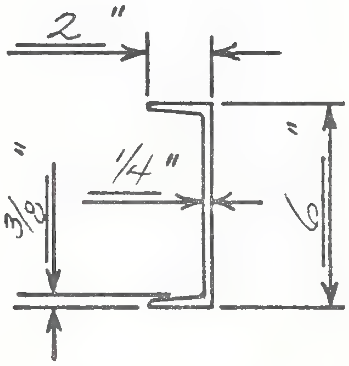
10 Stringers (total) Span Length 40' 0"



STRINGER "A"

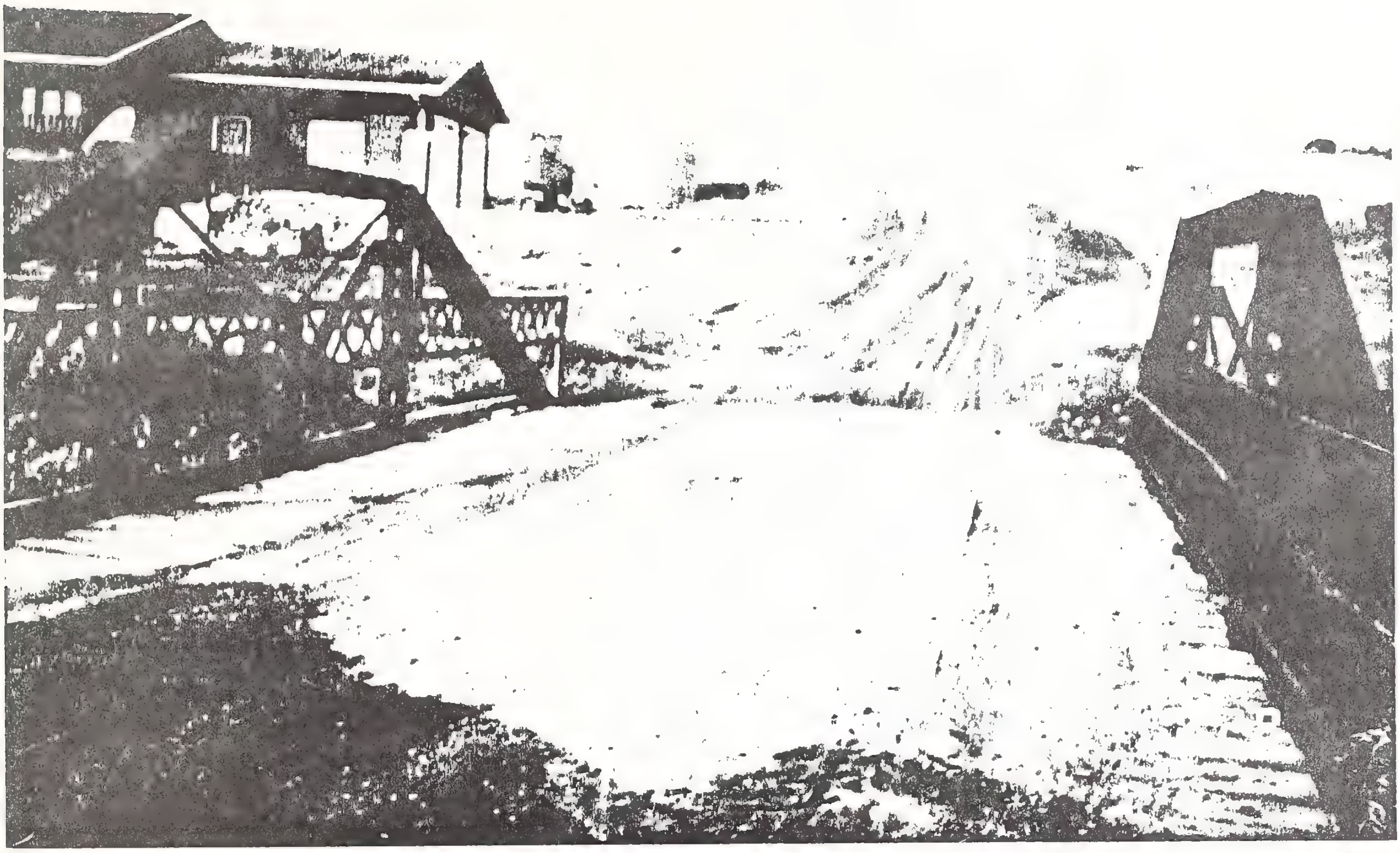


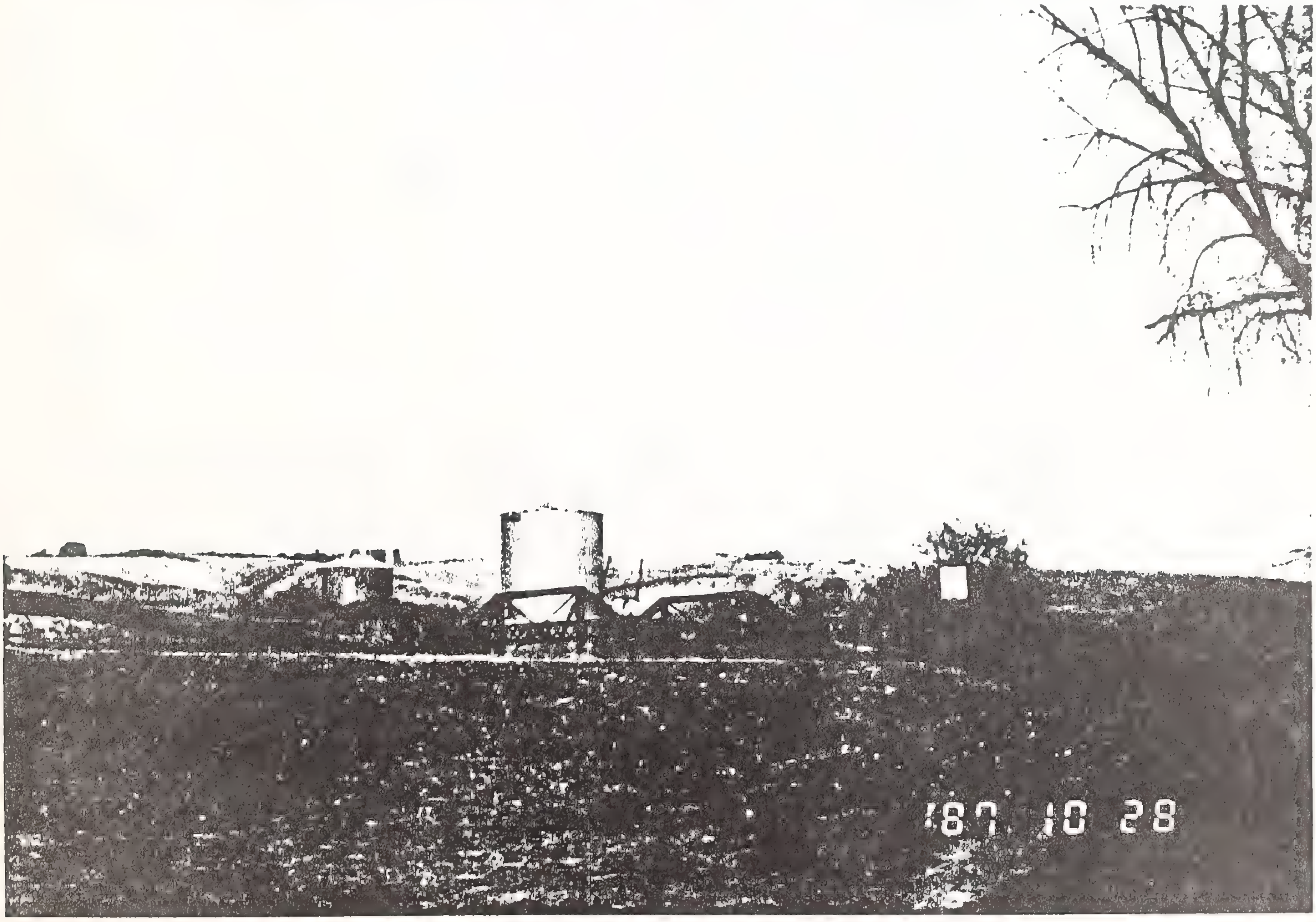
STRINGER "B"

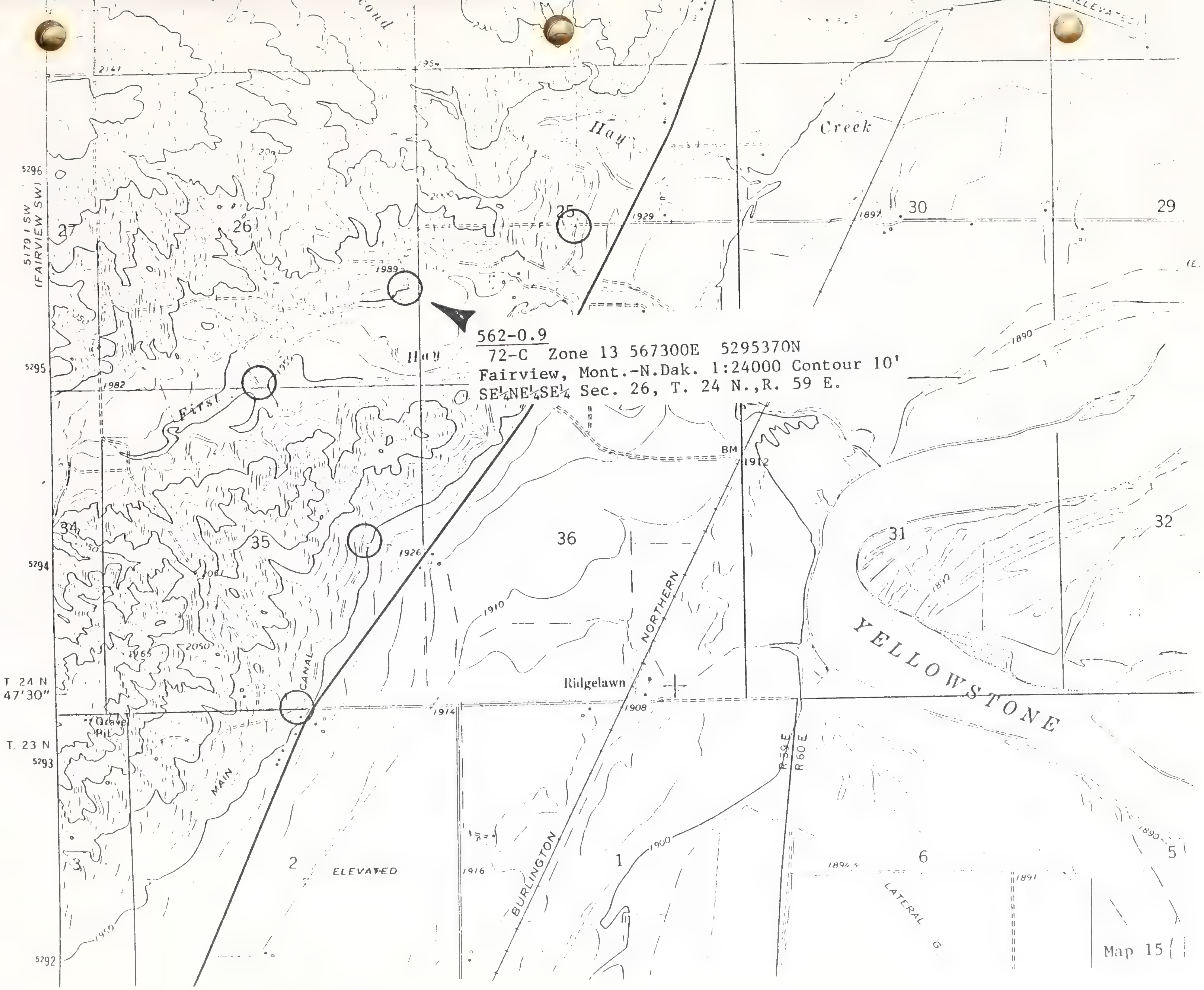


STRINGER "C"

Comments: Dbl. channels @ ℄ of str., stringers are in fair Condition (Light Rust). see photo for floor beams connection to stringers




'87 10 28



562-0.9
72-C Zone 13 567300E 5295370N
Fairview, Mont.-N.Dak. 1:24000 Contour 10'
SE¼NE¼SE¼ Sec. 26, T. 24 N.,R. 59 E.

Map 15

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL181* Site Name: *USRS Canal Bridge 3 Mi. SW Fairview*
Structure Number: *L42 562* 000+0.200 080-C Year Built: *1908*
Evaluation Determined Eligible ☐
Ineligible ☐
Date ☐

LOCATION: *Center Section, Sec. 25, T. 24 N., R. 59 E.*
UTM Zone: *13, 568175 E. 5295675 N.*
Quad Name: *Fairview, Montana-North Dakota* Scale: *1:24000*
County/City: *Richland* Route *562* Mile Crossing *Main Canal*

OWNERSHIP: MDOH ☐ County/City ☒ Federal ☐ Private ☐ Tribal ☐
Specify Richland

PRESENT USE: *USRS Main Canal Bridge*

BASIC BRIDGE (check as appropriate)

- ☐ Beam, Slab, Girder
- ☐ Suspension
- ☐ Arch
- ☐ Movable
- ☒ Truss
  - ☒ Pin connected
  - ☐ Rigid

MATERIALS

- ☐ Wood
- ☒ Metal
- ☐ Combination
- ☐ Stone
- ☐ Reinforced Concrete
- ☐ Prestressed Concrete

TYPE

- ☐ Deck
- ☒ Pony (plank deck and runners)
- ☐ Through
- ☐ Combination

TRUSS DESIGN

- ☐ King Post
- ☒ Queen Post
- ☐ Howe
- ☐ Pratt
  - ☐ Double Intersection
  - ☐ Half Hip
  - ☐ Parker
  - ☐ Camelback
  - ☐ Pennsylvania (Petit)
    - ☐ Sub Struts
    - ☐ Sub Ties
  - ☐ Baltimore
- ☐ Lenticular
- ☐ Warren
  - ☐ Verticles
  - ☐ Polygonal Chord
  - ☐ Double Intersecting
  - ☐ Quadrangular
  - ☐ K
- ☐ Other

Length *38'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *Concrete* No. Piers *0* Type
Designer/Engineer *US Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, MN*

PHOTOGRAPHIC RECORD

Roll 4, Frames 14-15

NARRATIVE DESCRIPTION

This A.Y. Bayne light steel pony truss is 38' in a single span. It is a pin-connected Queen Post with each of the three panels at 12'8", standing 6' high with a 17.7' deck. The bottom chord is forged steel eyebars, while the top is of 10" continuous steel plate strengthened by 2 channel sections with 1 acing bar on the bottom flanges. The verticals are 4 angle sections latticed together. Knee braces are riveted to the floor beams and then attached on the other end to the upper vertical members by means of an 8" plate. The diagonals are eyebars with turnbuckles. The guardrail, the most distinctive feature of the canal bridge is 2 angle sections connected by lattice bars in an 18" pattern.

NARRATIVE HISTORY

A bridge was not planned for this site. One was planned for Station 2841, north of the Second Hay Creek intersection with the canal (Station 2810). It may have been moved south of the intersection.

INTEGRITY *Good, end railing is bent. Sufficiency rating was 41.7 in 1986.*

Altered Unaltered *X* Moved *Yes* Date *Unknown*
Summary of Move: *Undetermined*

SIGNIFICANCE

The bridge is significant as one of the original USRS Canal bridges, but it has been moved to its current location.

PROPOSED IMPACTS/RECOMMENDATIONS

None.

Site Recorded By: *Edrie Vinson* Date: *January 26, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *The surface was considerably disturbed from the construction of the canal, roads, and leveled fields.*

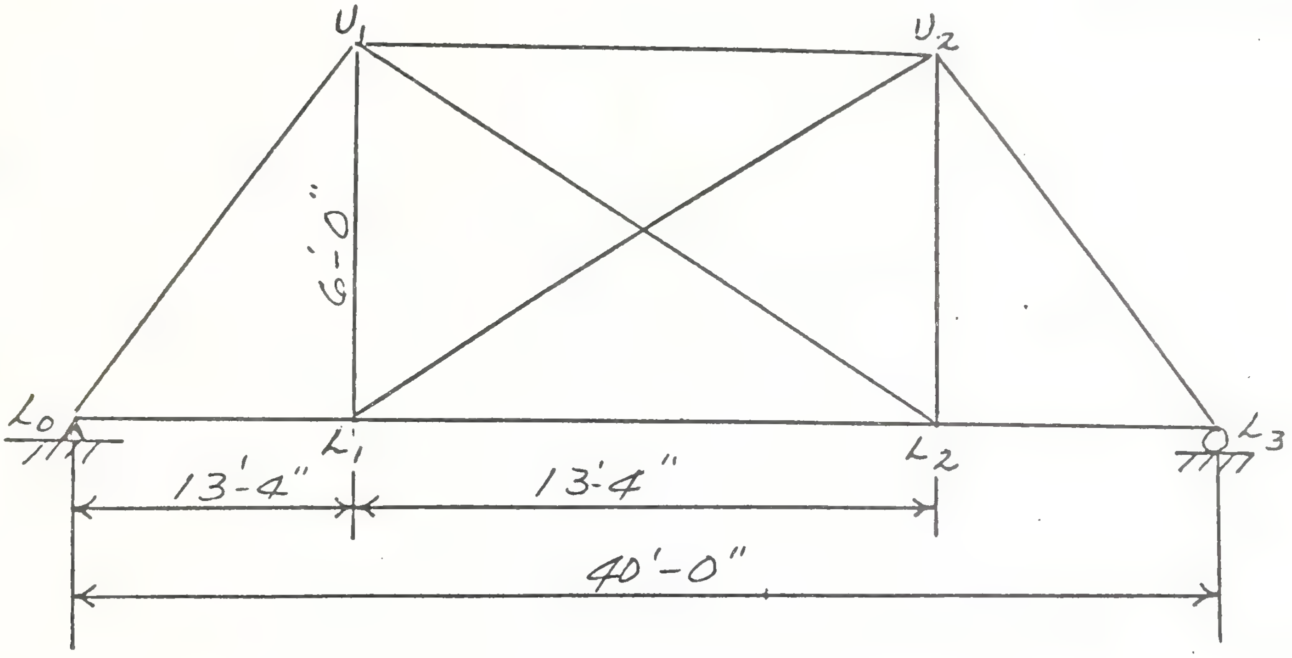
Was historical/architectural survey conducted around the structure?

Yes X No __

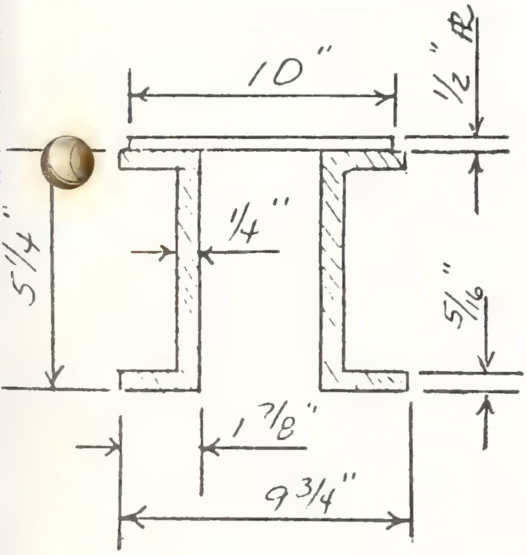
Results negative X

Comments: *Trailers are visible in the distance to the east. A windrow of trees hides a farm complex to the southwest.*

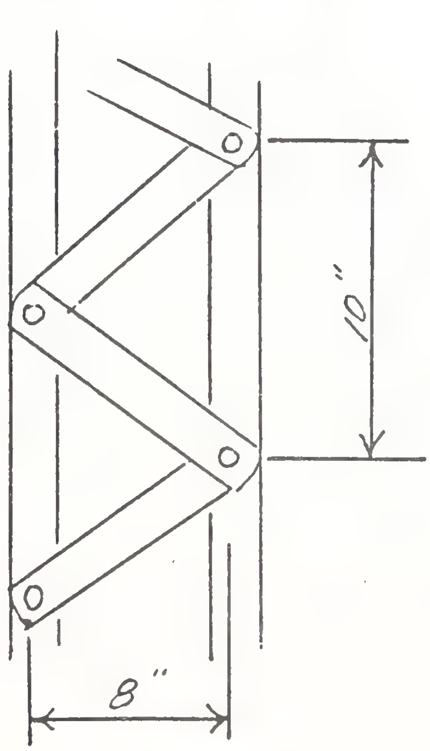
EV:nr:2/s



From Center of upstream Truss to Center of downstream Truss = 19'-0"



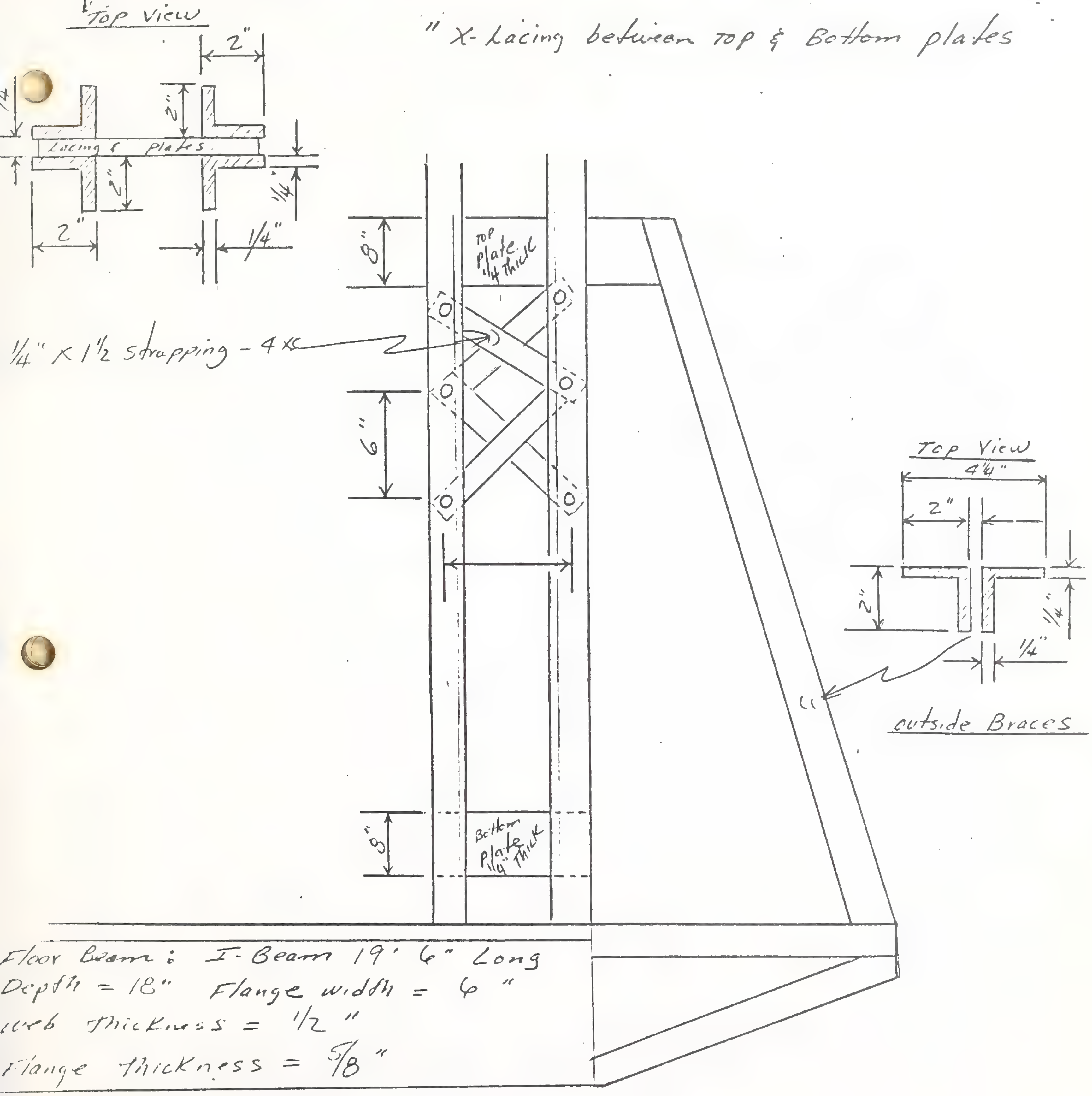
End Posts & Top chord
(L_0U_1; U_1U_2; U_2L_3).



(Bottom side)
1/4" X 1 1/2" strapping

Lower Chord & Diagonals

(L_0L_1; L_1L_2; L_2L_3) 2- eye bars 5/8" x 2 1/2".
(U_1L_2) – 1" Square rods
(U_2L_1) – 1" Square rods



Floor Beam: I-Beam 19' 6" Long
Depth = 18" Flange width = 6"
web Thickness = 1/2"
Flange thickness = 5/8"

Vertical Members & outside Bracing

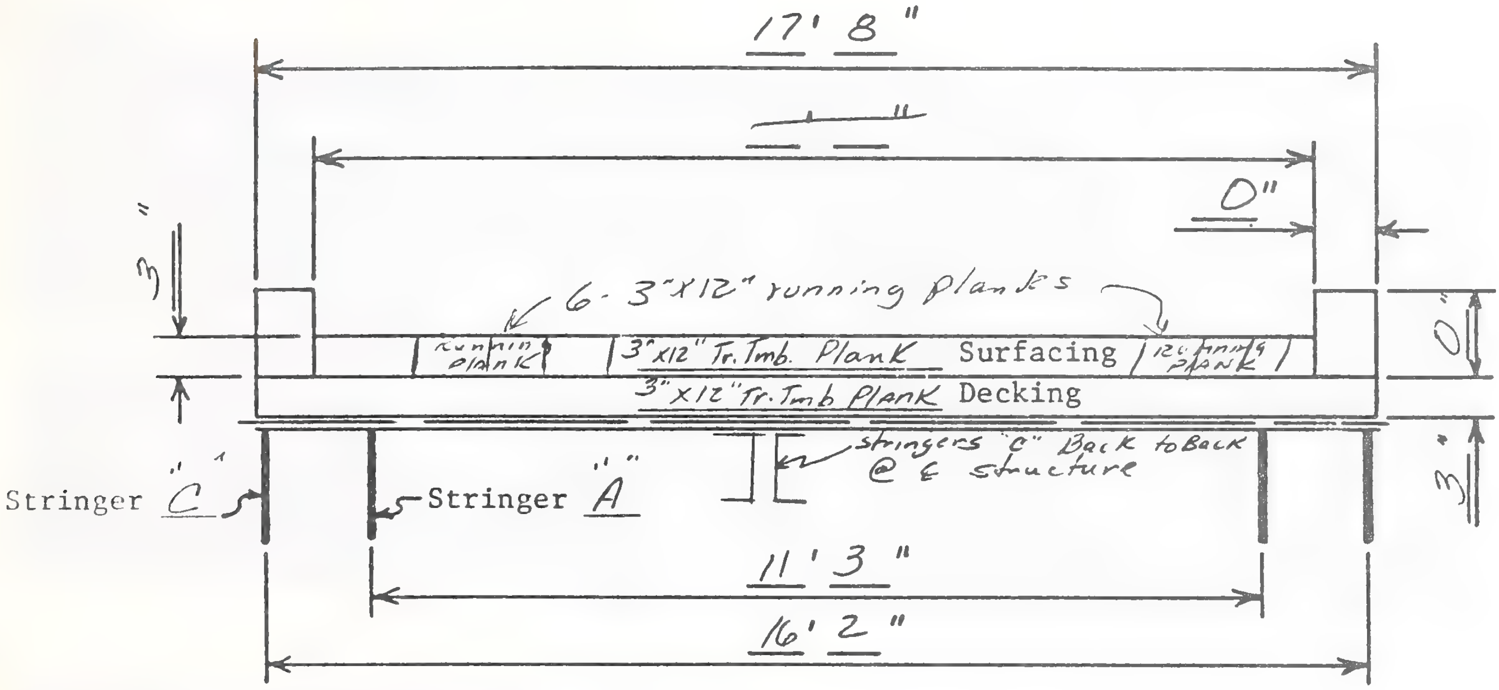
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

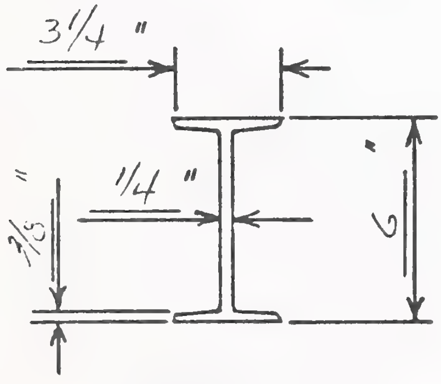
Structure Number 242562 00040.2001 Span(s) 1

Inspector K.Q.

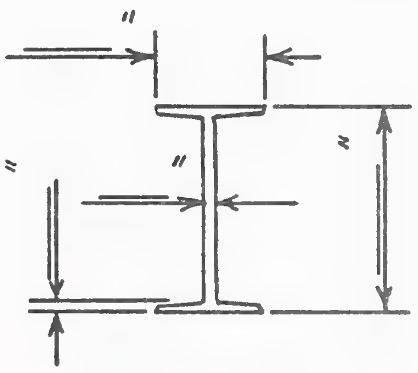
Date 10-15-84



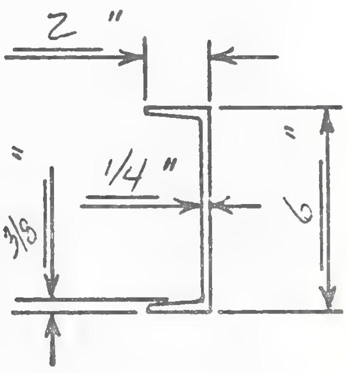
10 Stringers (total)   Span Length 40' 0"



STRINGER "A"

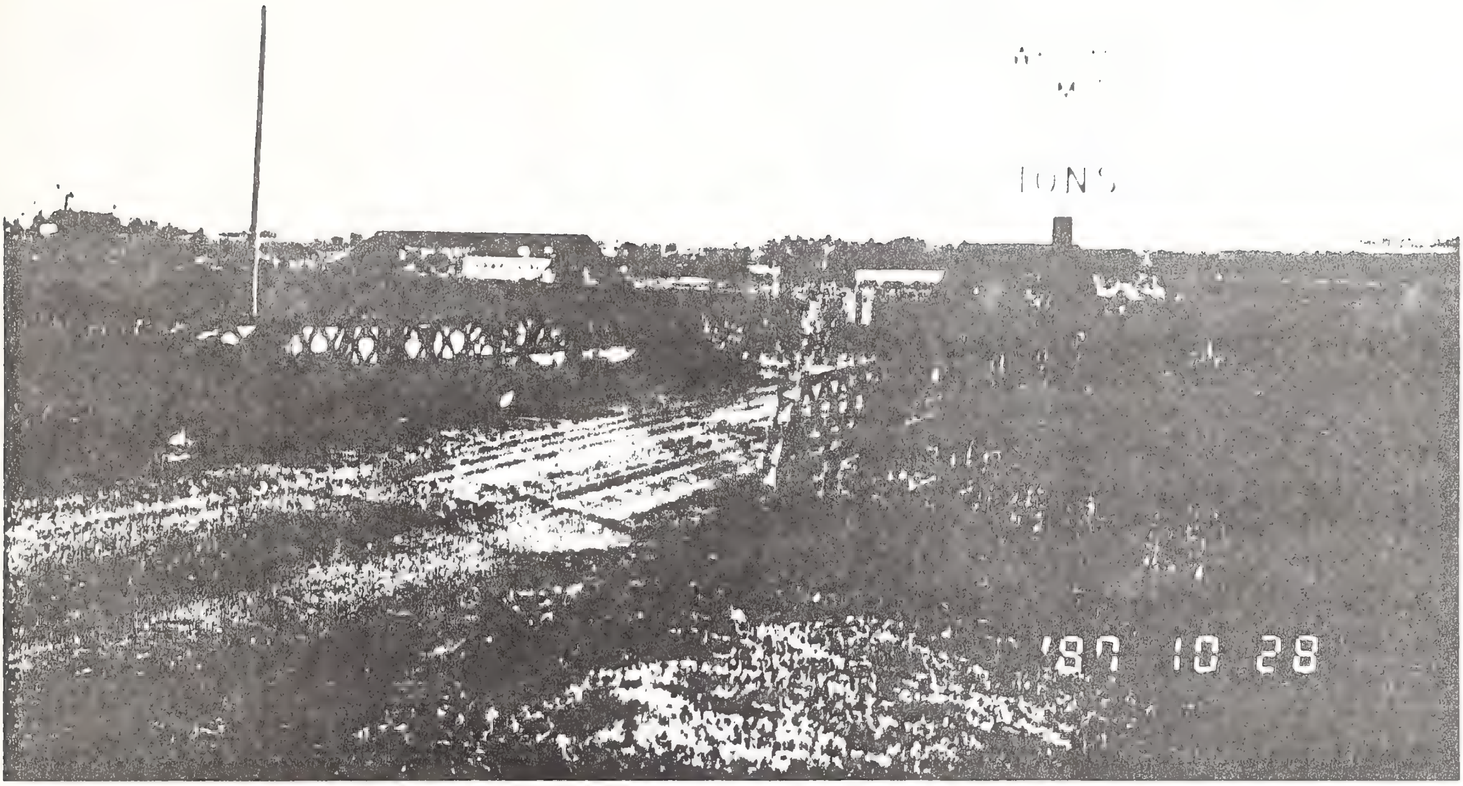


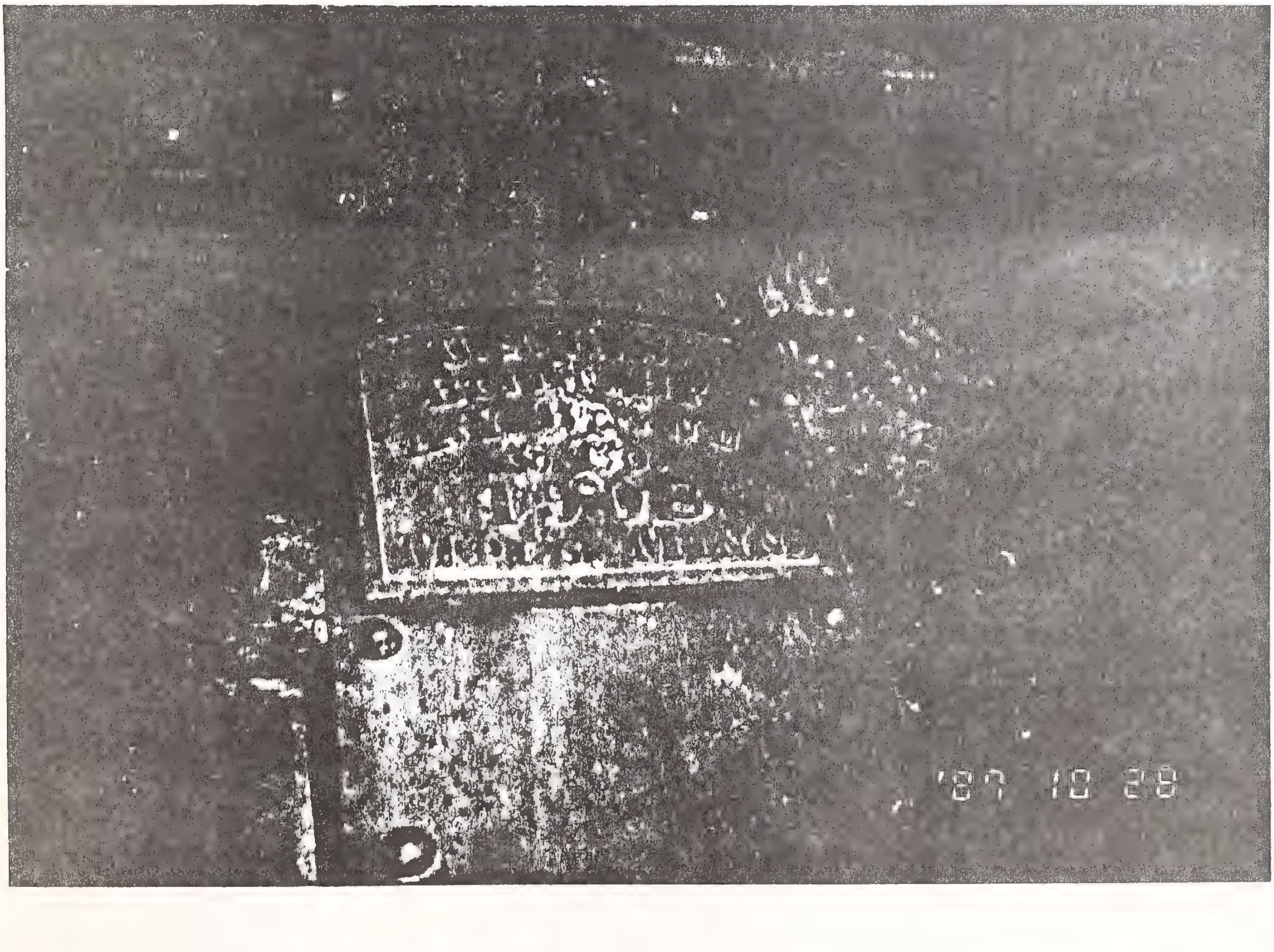
STRINGER "B"



STRINGER "C"

Comments: Dbl. Channels @ ℄ of Str., stringers are in fair condition (light Rust). See photo for floor beam connection to stringers


IONS
'87 10 28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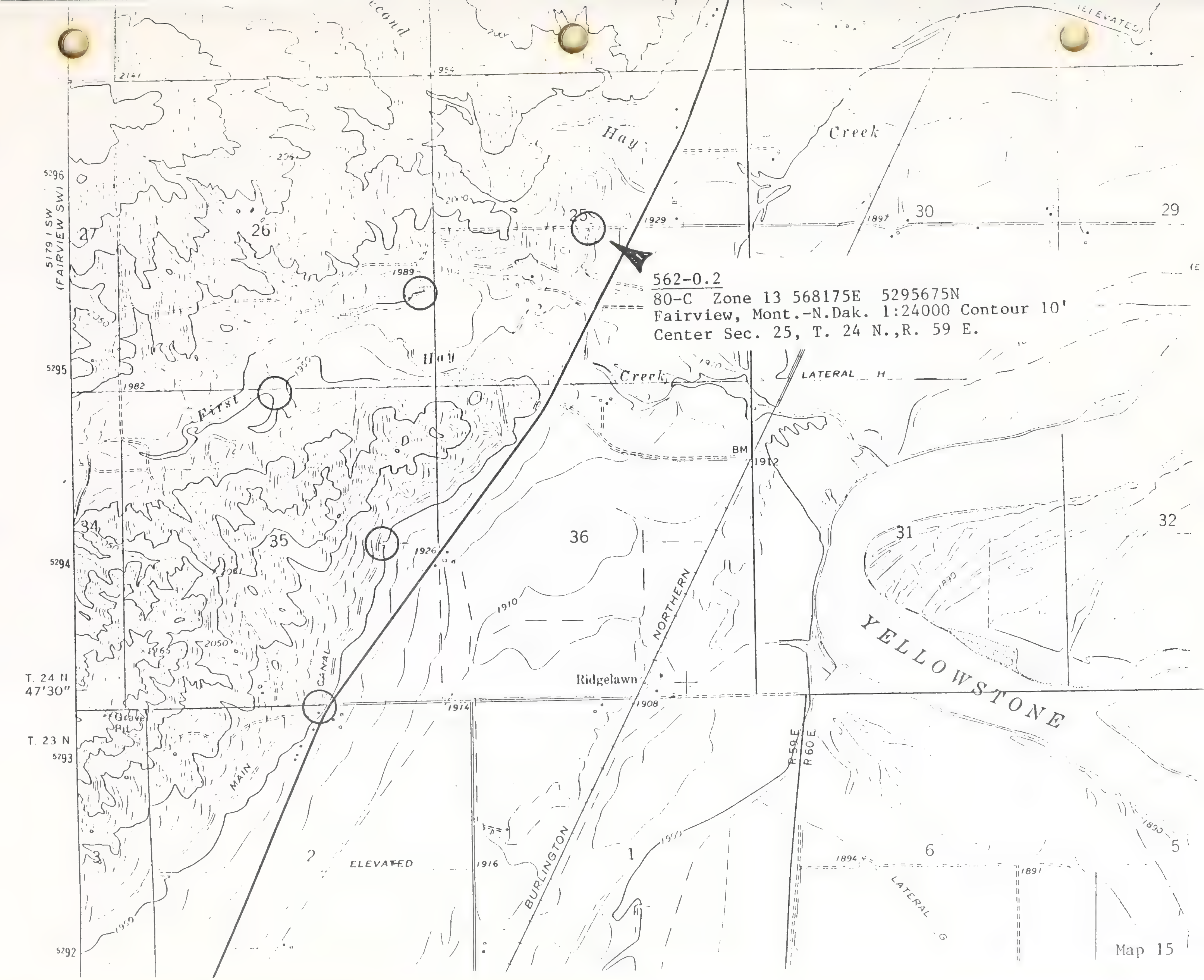


562-0.2
80-C Zone 13 568175E 5295675N
Fairview, Mont.-N.Dak. 1:24000 Contour 10'
Center Sec. 25, T. 24 N.,R. 59 E.

Map 15

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL182* Site Name: *USRS Canal Bridge, 2 Mi. SW Fairview*
Structure Number: *L42 561 000+0.100-1 082-C* Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *SW¼NE¼NW¼, Sec. 19 T. 24 N., R. 60 E.*
UTM Zone: *13, 569540 E. 5297880 N.*
Quad Name: *Fairview, Mont. - N. Dak.* Scale: *1:24,000*
County/City: *Richland* Route *561* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City _X_ Federal __ Private __ Tribal __
Specify _Richland_

PRESENT USE: *USRS Main Canal Bridge, rural access*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
_X_ Truss
  _X_ Pin connected
  __ Rigid

MATERIALS

__ Wood
_X_ Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
_X_ Pony (Wood Plank Deck)
__ Through
__ Combination

TRUSS DESIGN

__ King Post
_X_ Queen Post
__ Howe
__ Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
  __ K
__ Other

Length *34'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Services, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 5, Frames 0, 1 and 2

NARRATIVE DESCRIPTION

This is a single span, pin-connected Queen Post Pony Truss 34' in length. Each of the three panels measures 11'-4", are 6' high, and the deck is 17.7' wide. The lower chord is of forged steel eyebars, while the upper chord is steel plate on two channel sections that are laced along the bottom flanges. Vertical members are composed of four angle sections latticed together. A double angle knee brace supports the verticals. Eyebars with turnbuckles form the diagonal tension members. The guardrail is two angle sections connected by lattice bars.

NARRATIVE HISTORY

Station 2938 is probably this site. Not all of the project area was surveyed by USGS or the GLO when project maps were completed, so a certain amount of guesswork is required to place information on up-to-date maps. If correct, this was to have been a light 32' steel truss. Obviously the canal was wider than planned, so it had to be built to 34' to span it.

INTEGRITY *Good. Sufficiency rating in 1986 was 41.7.*

Altered Unaltered Moved *Probably Not* Date
Summary of Move:

SIGNIFICANCE

As one of the USRS Canal bridges, it has historic significance.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 26, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

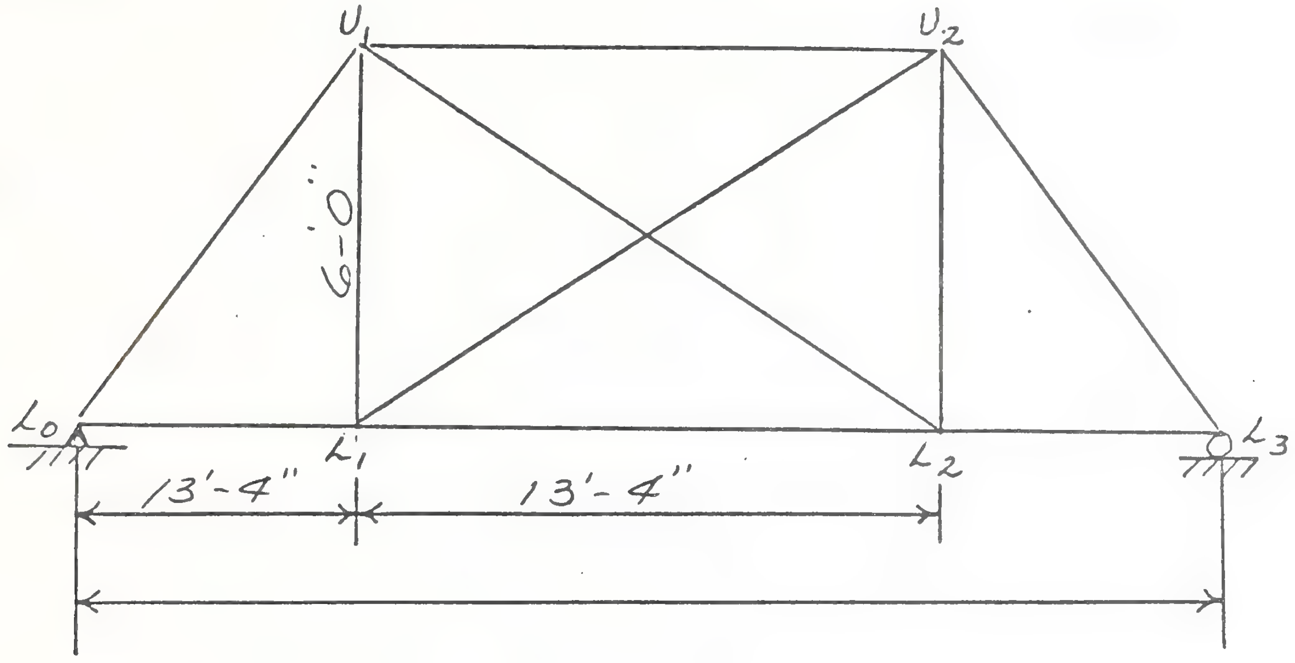
Results negative X
Comments: *Canal and road construction, plus leveling fields have caused surface disturbance many years ago.*

Was historical/architectural survey conducted around the structure?

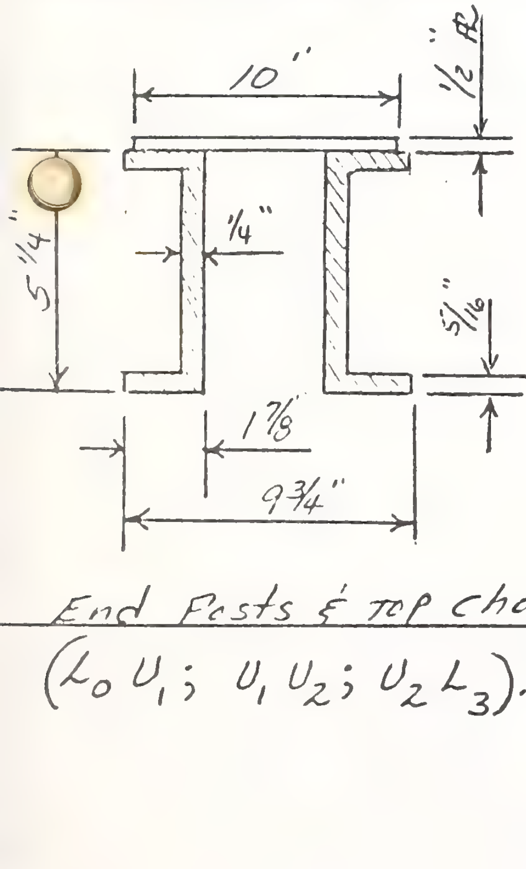
Yes X No __

Results negative X
Comments: *More than 200' away is a house, garage complex not recorded.*

EV:3:cm:248/1

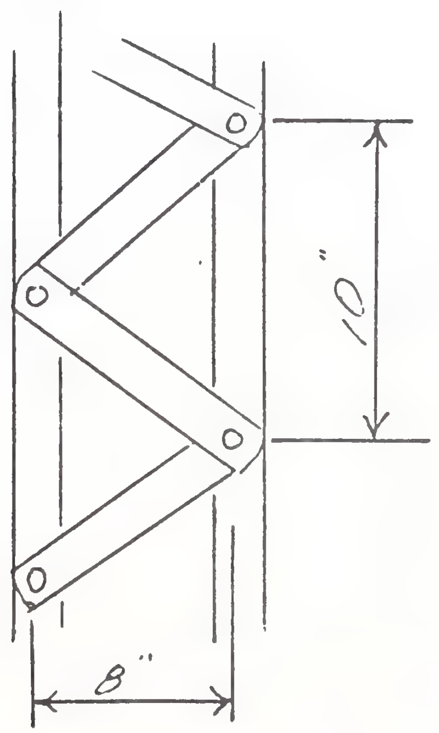


From Center of upstream Truss to Center of downstream Truss = 19'-0"



End Posts & Top Chord

(L_0U_1; U_1U_2; U_2L_3).



(Bottom side)
¼" x 1½" strapping

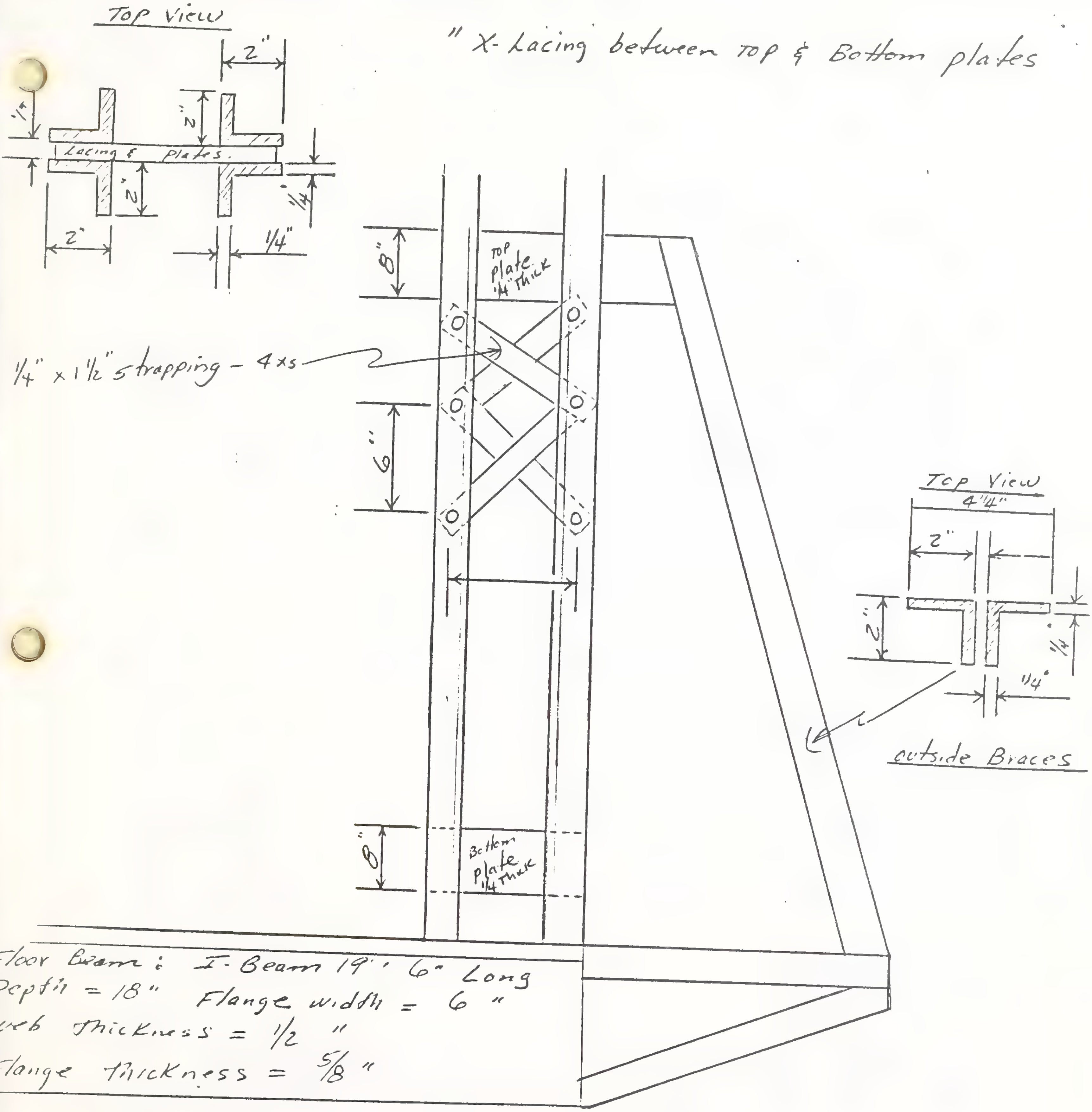
Lower Chord & Diagonals

(L_0L_1; L_1L_2; L_2L_3) 2- eye bars ⅝" x 2½".

(U_1L_2) – 1" Square Rod

(U_2L_1) – 1" Square Rod

" X-Lacing between Top & Bottom plates



Floor Beam: I-Beam 19' 6" Long
Depth = 18" Flange width = 6"
web Thickness = 1/2"
Flange thickness = 5/8"

Vertical Members & outside Bracing

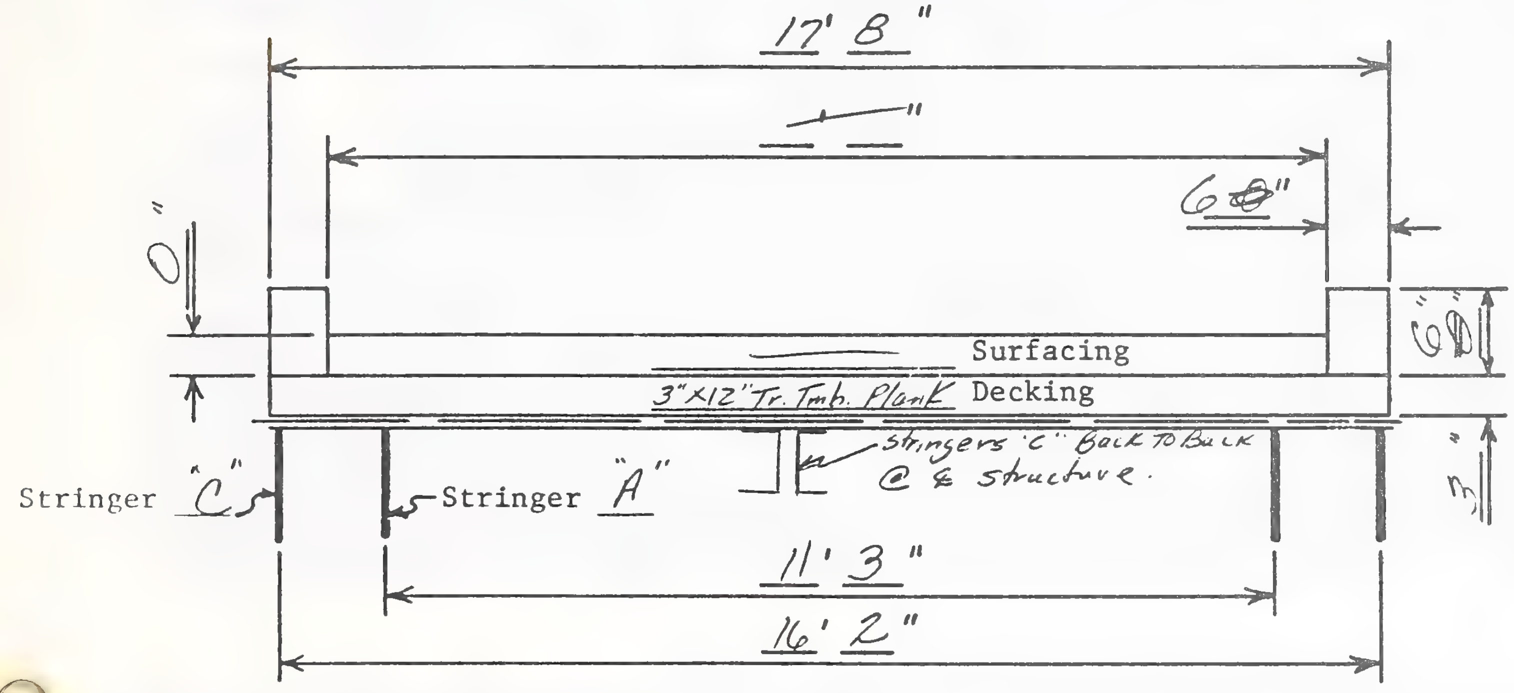
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number L42561 000+0.1001 Span(s) 1

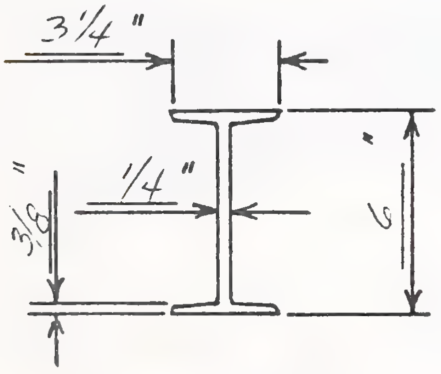
Inspector K.Q.

Date 10-15-84



10 Stringers (total)

Span Length 40' 0"



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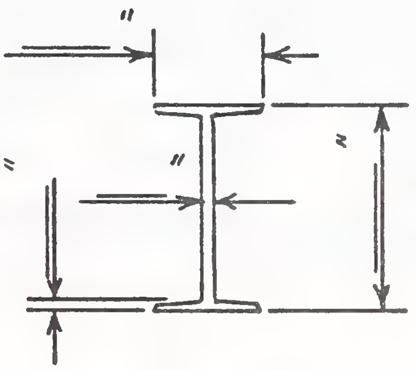
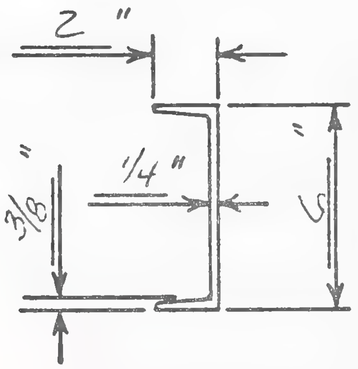
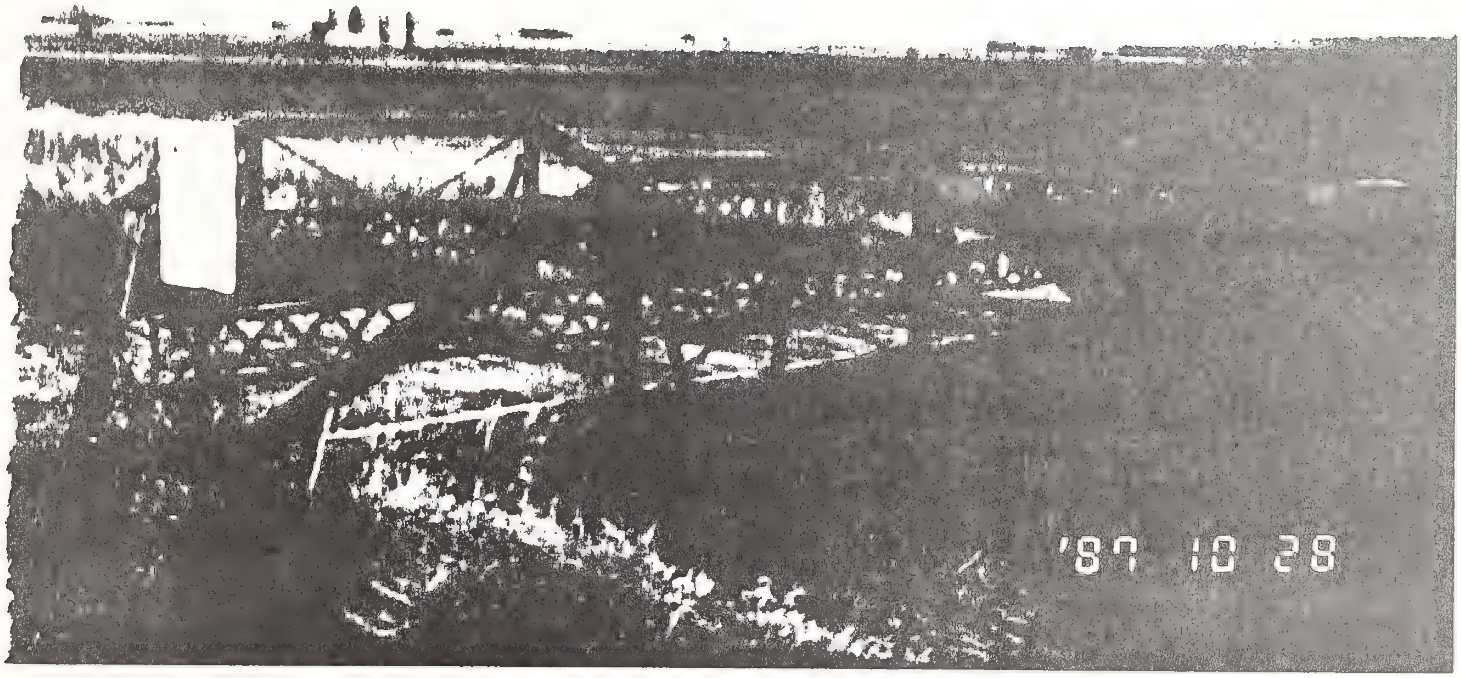


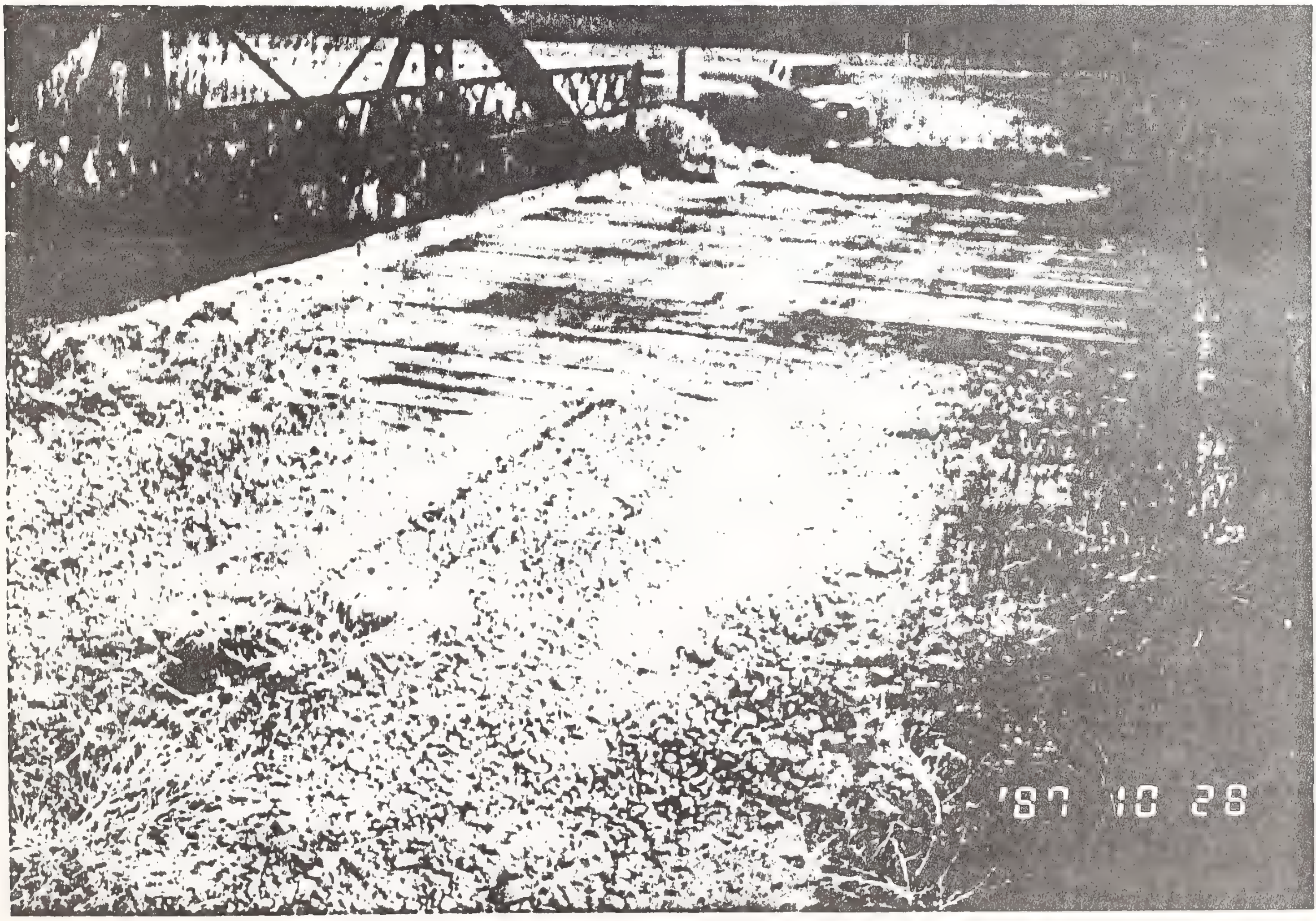
STRINGER "B"

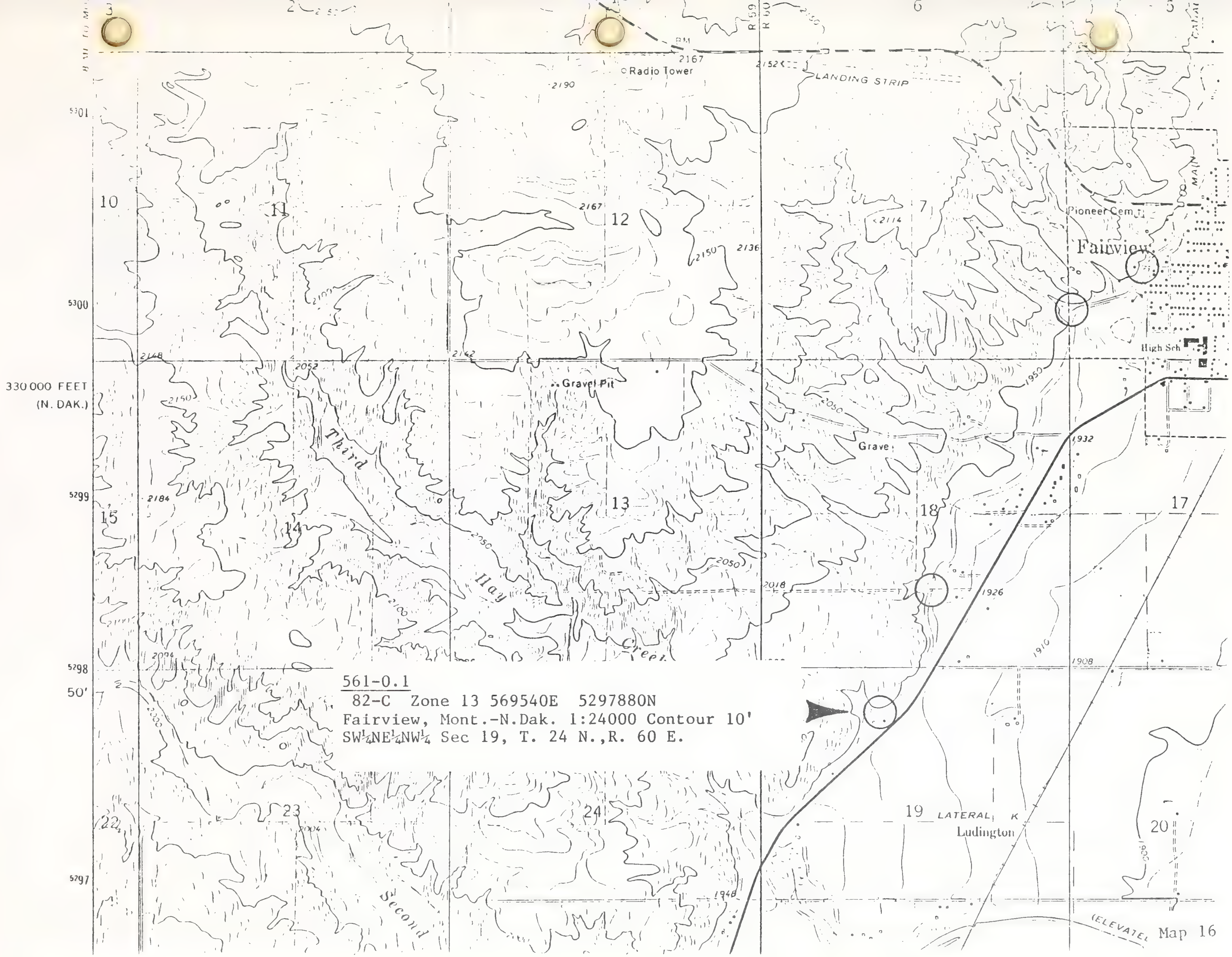


STRINGER "C"

Comments: Dbl. channel @ ℄ of str. stringers are in fair condition (light rust). See photo for floor beam connection to stringers.


'87 10 28


'87 10 28



561-0.1
82-C Zone 13 569540E 5297880N
Fairview, Mont.-N.Dak. 1:24000 Contour 10'
SW¼NE¼NW¼ Sec 19, T. 24 N.,R. 60 E.

Map 16

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL183* Site Name: *USRS Canal Bridge, 2 Mi. SW Fairview*
Structure Number: *L42 560 000+0.200-1 083-C* Year Built: *1908*
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *Centerline of SE¼ near west line, Sec. 18 T. 24 N., R. 60 E.*
UTM Zone: *13, 569805 E. 5298510 N.*
Quad Name: *Fairview, Mont. - N. Dak.* Scale: *1:24,000*
County/City: *Richland* Route *560* Mile Crossing *Main Canal*

OWNERSHIP: MDOH ___ County/City X Federal ___ Private ___ Tribal ___
Specify Richland

PRESENT USE: *USRS Main Canal Bridge*

BASIC BRIDGE (check as appropriate)

- ___ Beam, Slab, Girder
- ___ Suspension
- ___ Arch
- ___ Movable
- X Truss
  - X Pin connected
  - ___ Rigid

MATERIALS

- ___ Wood
- X Metal
- ___ Combination
- ___ Stone
- ___ Reinforced Concrete
- ___ Prestressed Concrete

TYPE

- ___ Deck
- X Pony
- ___ Through
- ___ Combination

TRUSS DESIGN

- ___ King Post
- X Queen Post
- ___ Howe
- ___ Pratt
  - ___ Double Intersection
  - ___ Half Hip
  - ___ Parker
  - ___ Camelback
  - ___ Pennsylvania (Petit)
    - ___ Sub Struts
    - ___ Sub Ties
  - ___ Baltimore
- ___ Lenticular
- ___ Warren
  - ___ Verticles
  - ___ Polygonal Chord
  - ___ Double Intersecting
  - ___ Quadrangular
  - ___ K
- ___ Other

Length *32'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 4, Frames 19, 20, 21, 22

NARRATIVE DESCRIPTION

This is a single span, 32-foot, pin-connected Queen Post pony truss. The three panels are 10'-8" each, and stand 6' high. The deck is 17.7' wide. The lower chord is forged steel eyebars, and the upper chord is a continuous steel plate riveted atop two channel sections that have been laced together along the bottom flanges. The vertical compression members are four angle sections latticed together. Knee braces are riveted to the floor beams and then attached to the upper vertical with an 8" plate. Diagonals are eyebars with turnbuckles. The guardrail is two angle sections connected by lattice bars. It measures 18" high.

NARRATIVE HISTORY

No bridge was planned for this location, so unless the record does not show a change that actually occurred, the bridge was built elsewhere, then moved here later.

INTEGRITY *Good. The sufficiency rating was 41.7 in 1986.*

Altered Unaltered *X* Moved *Yes* Date *Unknown*
Summary of Move:

SIGNIFICANCE

The bridge is historically significant as one of the original USRS main canal bridges, but it has been moved to its current location, rendering it ineligible for listing on the National Register.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 26, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

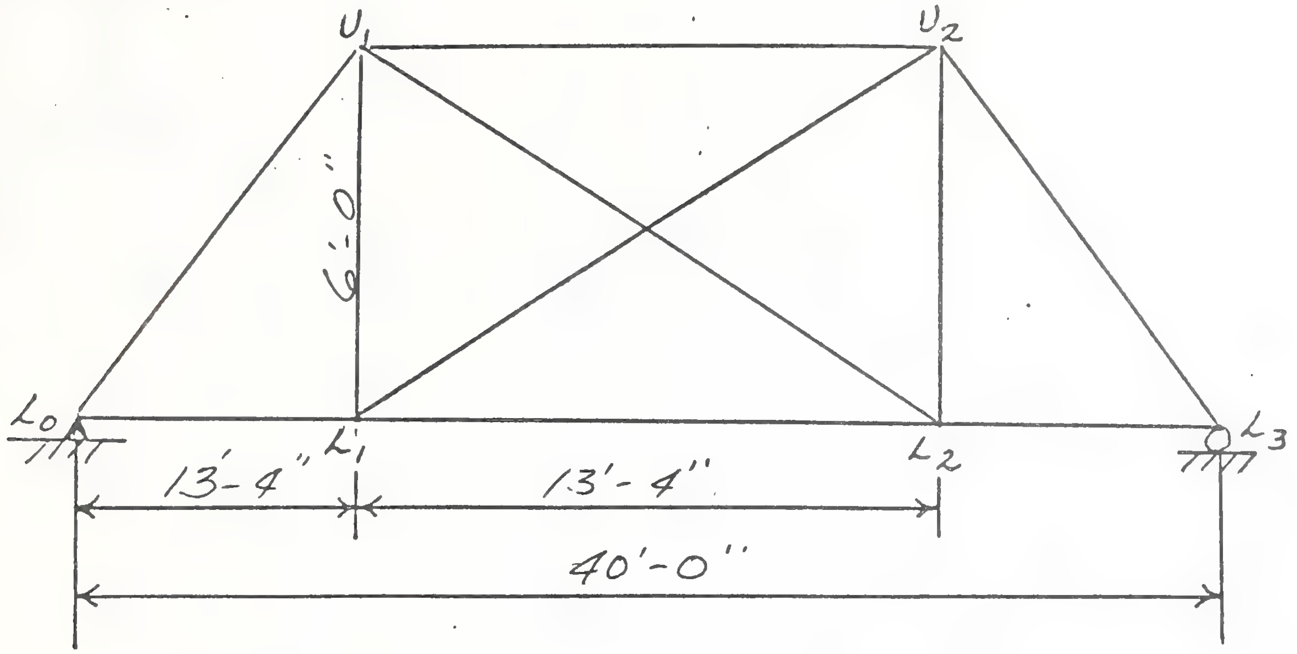
Yes X No __

Results negative X
Comments: *Field leveling, canal and road construction have altered the surface.*

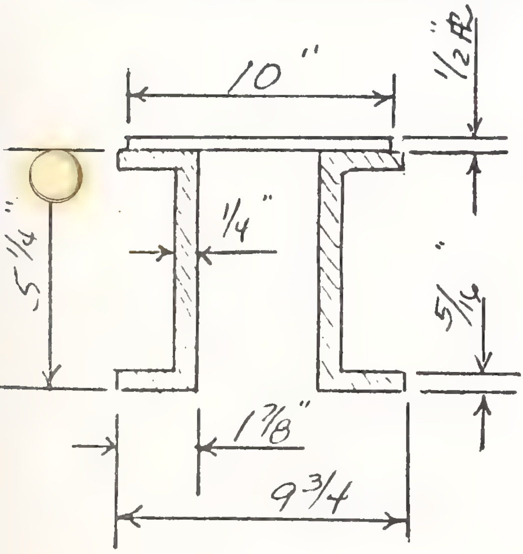
Was historical/architectural survey conducted around the structure?

Yes X No __

Results negative X
Comments: *There are properties 500' away that were not recorded.*
EV:3:cm:248/g

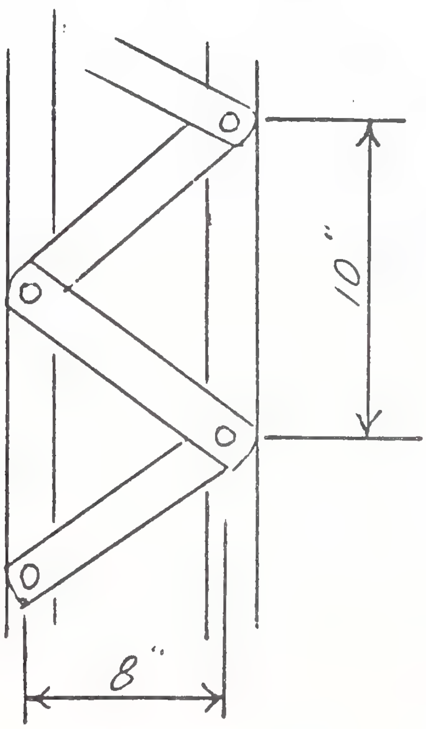


From Center of upstream Truss to Center of downstream Truss = 19'-0"



End Posts & Top Chord

(L_0U_1; U_1U_2; U_2L_3).



(Bottom side)

1/4" X 1 1/2" strapping

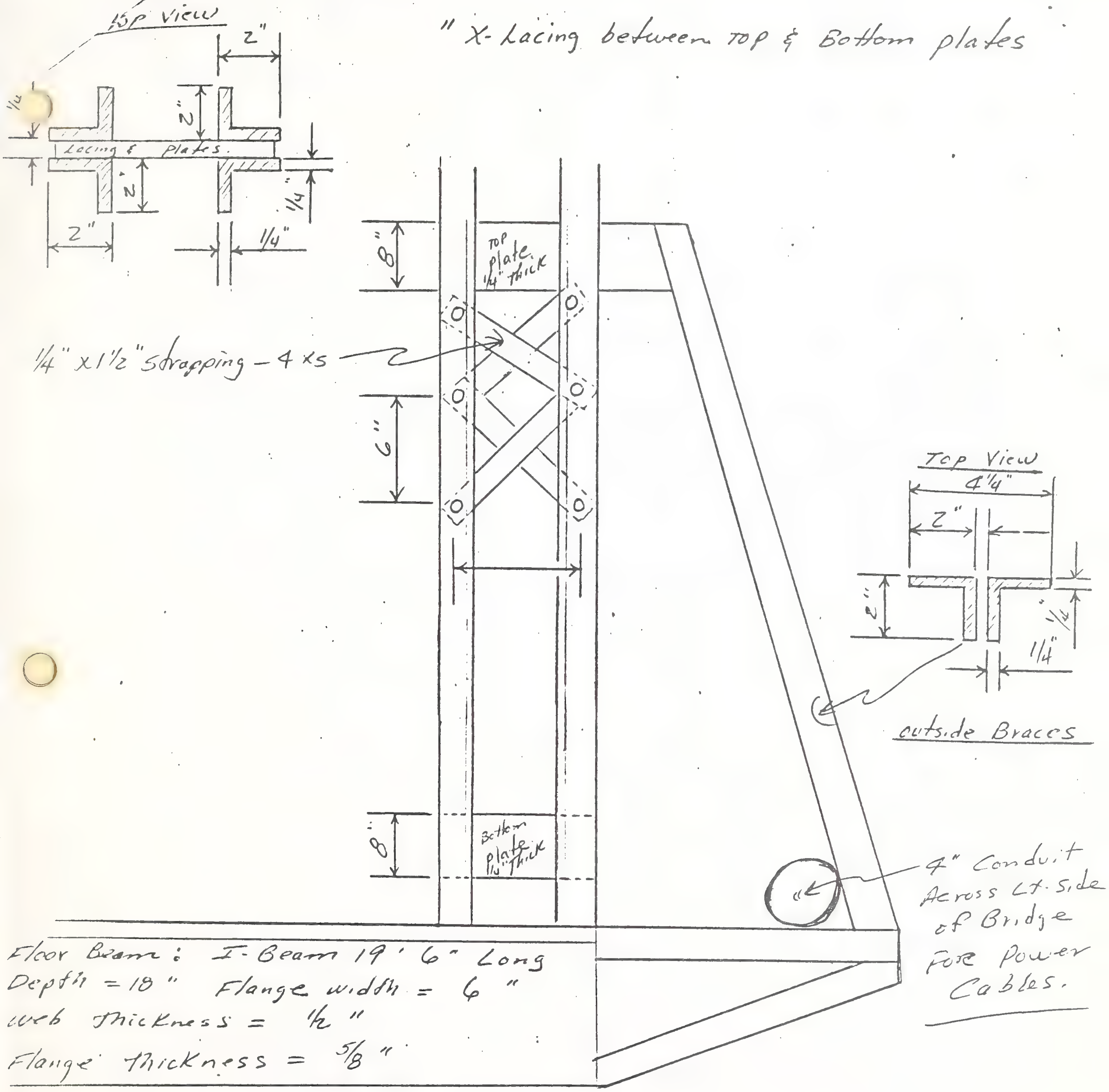
Lower Chord & Diagonals

(L_0L_1; L_1L_2; L_2L_3) 2- eye bars 5/8" x 2 1/2".

(U_1L_2) – 1" Square Rod

(U_2L_1) – 1" Square Rod

" X-Lacing between Top & Bottom plates



Floor Beam: I-Beam 19' 6" Long
Depth = 18" Flange width = 6"
web Thickness = 1/2"
Flange Thickness = 5/8"

Vertical Members & outside Bracing

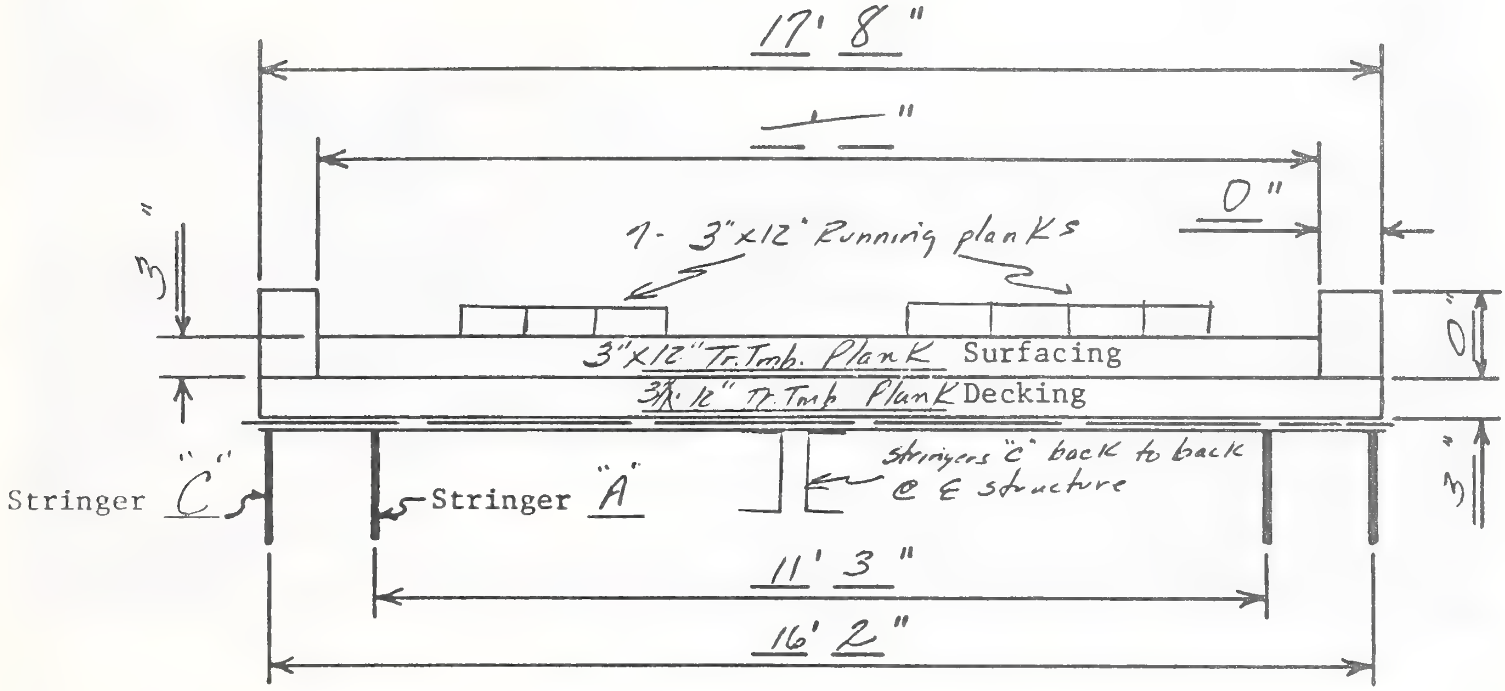
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number L42560 00040.2001 Span(s) 1

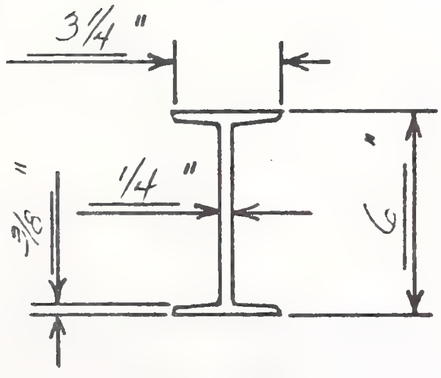
Inspector K.Q.

Date 10-16-84

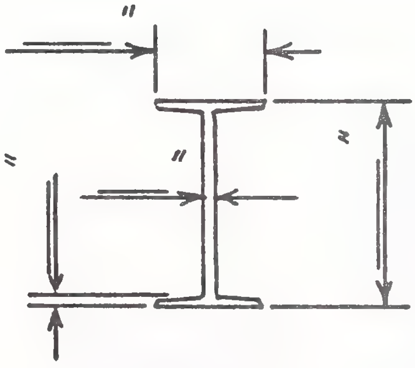


17' 8"
— "
0"
1- 3"x12" Running planks
3"
3"x12" Tr.Tmb. Plank Surfacing
3"x12" Tr.Tmb Plank Decking
0"
3"
Stringer "C"
Stringer "A"
stringers "c" back to back @ ℄ structure
11' 3"
16' 2"

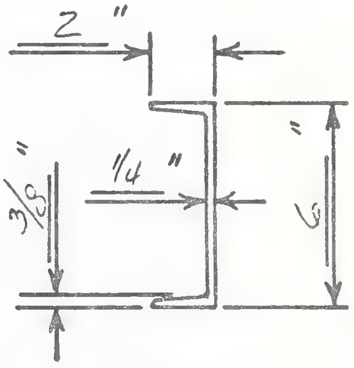
10 Stringers (total) Span Length 40' 0"



STRINGER "A"

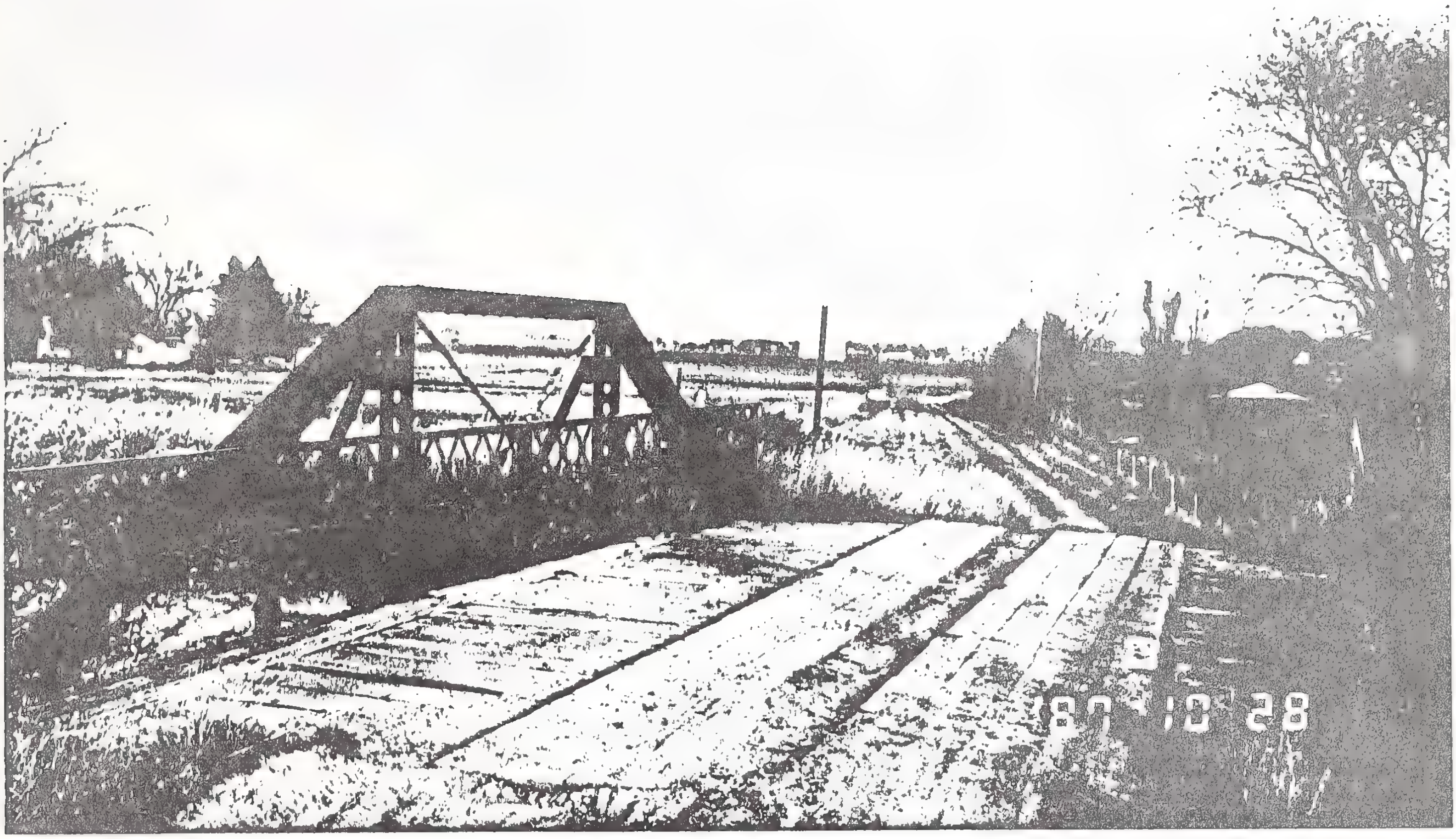


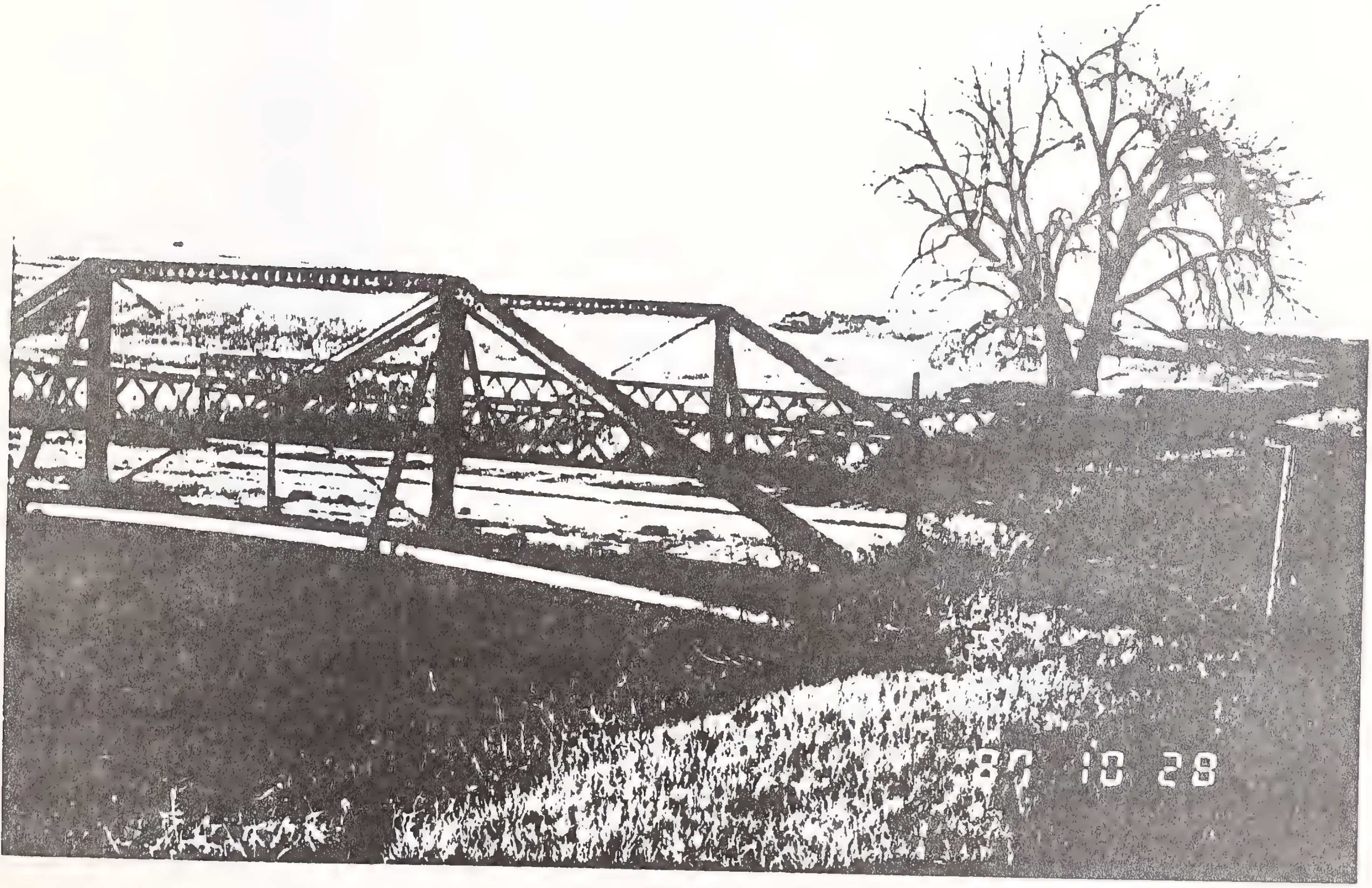
STRINGER "B"

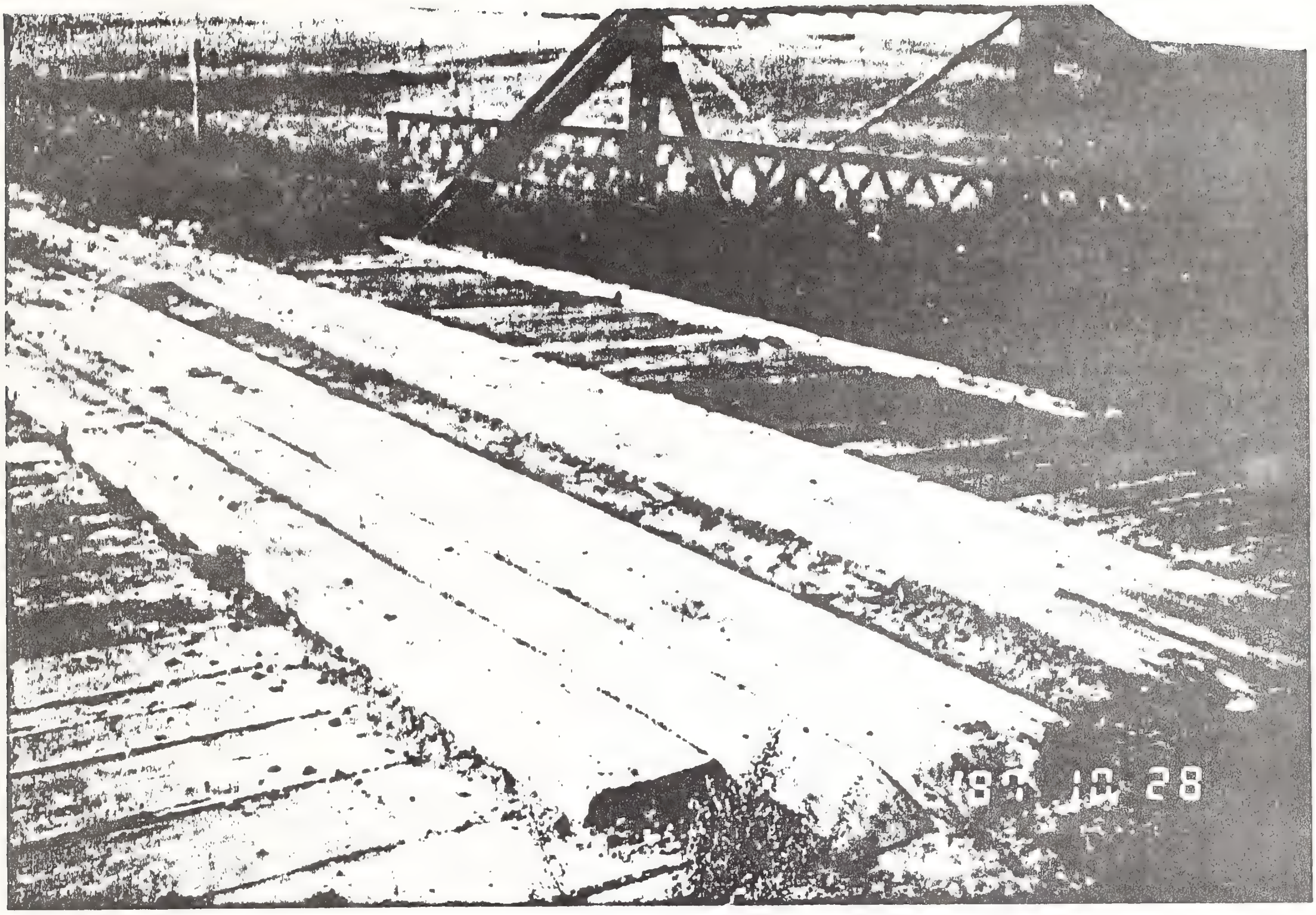


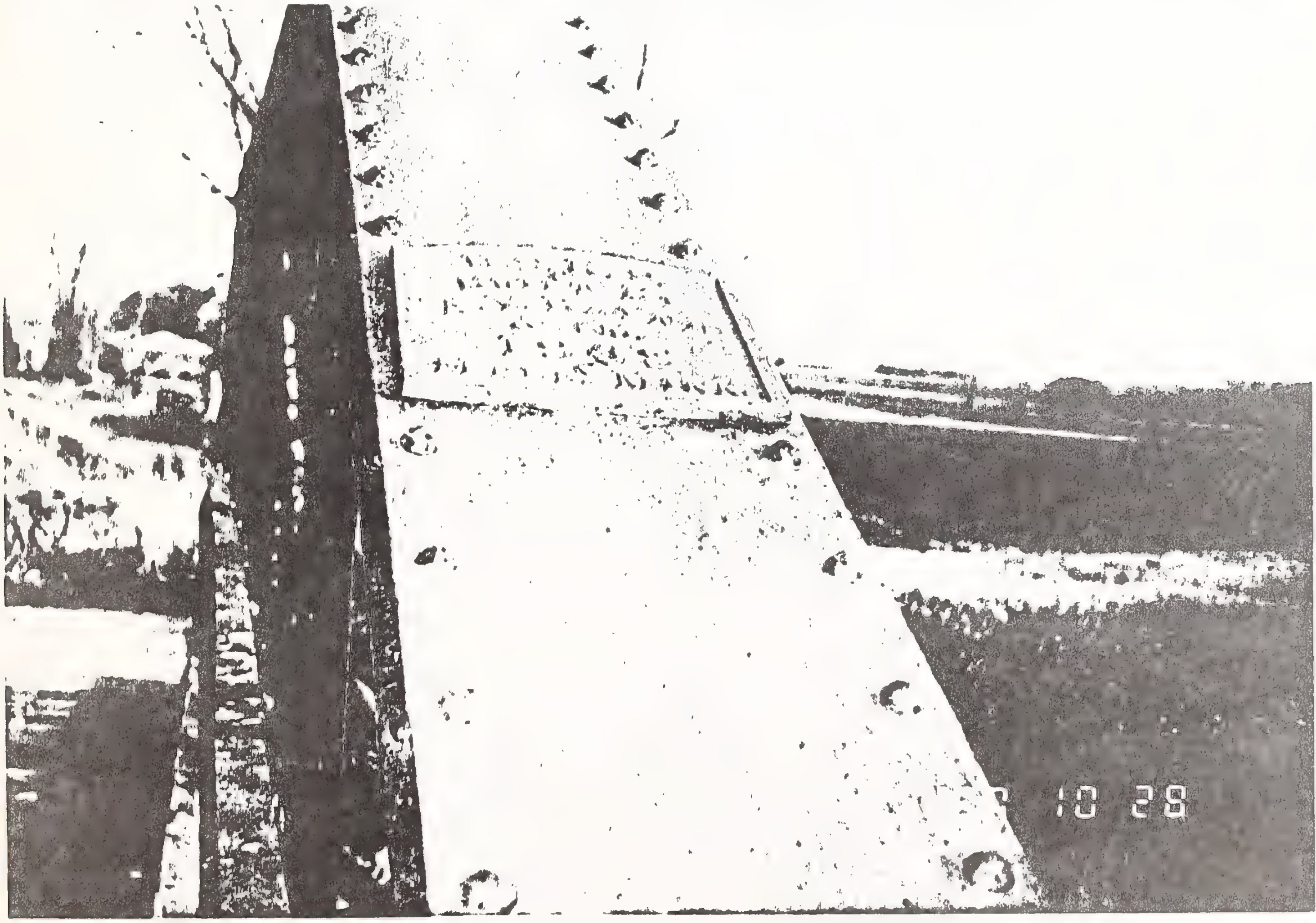
STRINGER "C"

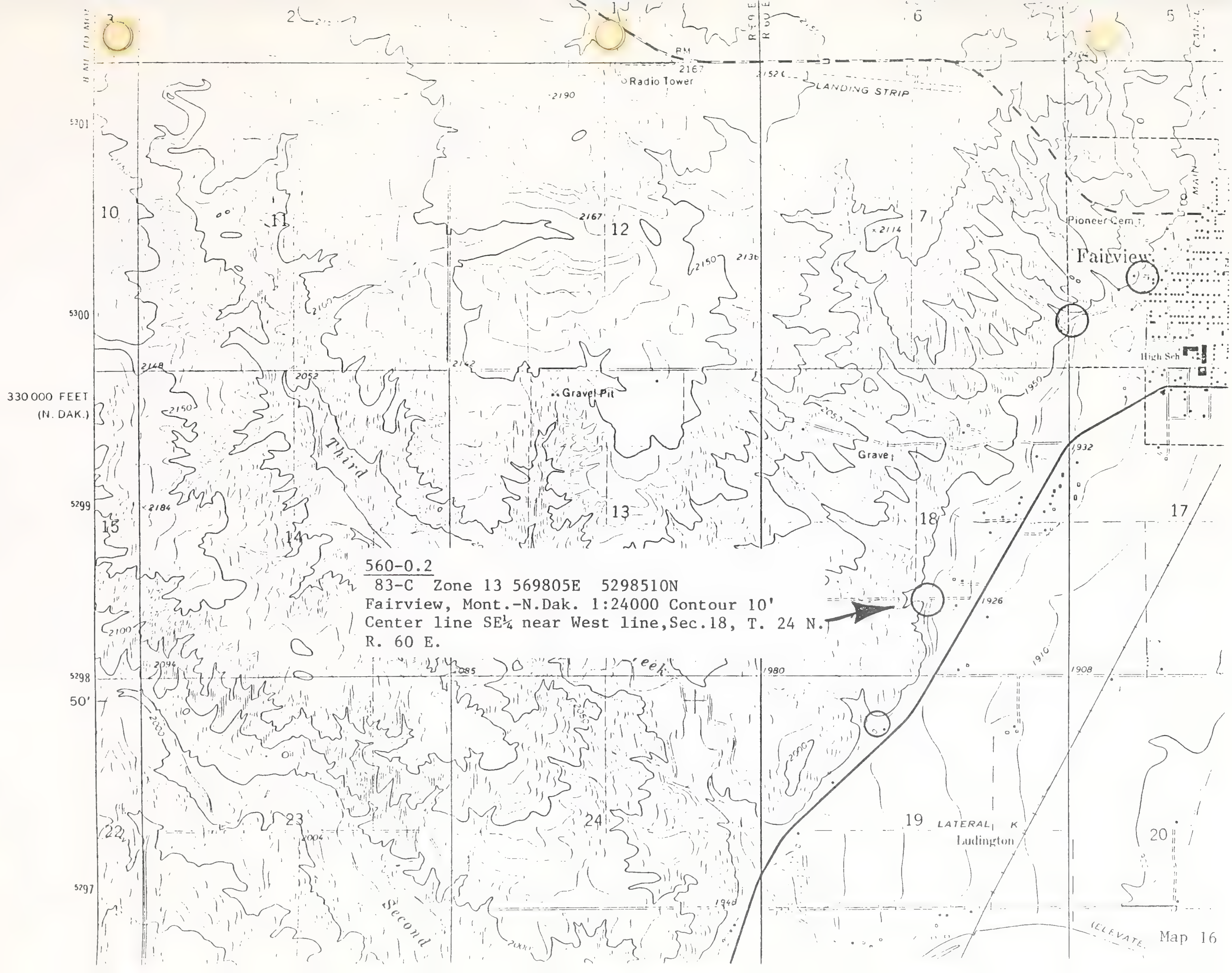
Comments: Dbl. channel @ ℄ of str., stringers are in fair Condition (Light Rust). See photo for floor beam Connection to stringers


'87 10 28


'87 10 28


10 28


10 28



560-0.2

83-C Zone 13 569805E 5298510N

Fairview, Mont.-N.Dak. 1:24000 Contour 10'

Center line SE¼ near West line, Sec.18, T. 24 N.

R. 60 E.

Map 16

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL184* Site Name: *USRS Main Canal - Fairview*
Structure Number: *M42 042 000+0.020-1 091-M* Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *NW¼SW¼SW¼, Sec. 8 T. 24 N. R. 60 E.*
UTM Zone: *13, 570525 E. 5300000 N.*
Quad Name: *Fairview, Montana - North Dakota* Scale: *1:24,000*
County/City: *Richland* Route *042* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City __ Federal __ Private X Tribal __
Specify Roger Johnson

PRESENT USE: *Bridge across the canal at 7th Street, Fairview, on county road 042.*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
  X Pin connected
  __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
X Pony
__ Through
__ Combination

TRUSS DESIGN

__ King Post
X Queen Post
__ Howe
__ Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
__ K
__ Other

Length *40* Width *17.4* No. spans *1* No. panels *3*
Abutments *Concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A. P. Davis, Chief Engineer*
Fabricator *Lackawana Steel*

Builder/Contractor *Minneapolis Steel and Machinery Company*

PHOTOGRAPHIC RECORD

Roll 11, Frames 5 and 6.

NARRATIVE DESCRIPTION

This pin-connected Queen Post Pony Truss was constructed by the Minneapolis Steel and Machinery Co. of Minneapolis, Minnesota in 1908 for the U.S. Reclamation Service. It is a single span, 40' in length, and 17.4' wide, 6½' high with three panels 13'4" each. The bottom chord is forged steel eyebars; vertical members are two angle sections with riveted lacing bars; counters are eyebars with turnbuckles; and the top chord and inclined end posts is a continuous plate riveted atop two channel sections with lacing bars riveted along the bottom flanges. Double angle sections from knee braces that are riveted to the floor beams and connect at the top of the vertical members. The deck is wood plank. The substructure is as follows: Two large I-beam floor beams cross under each vertical member, and support 9 I-Beam stringers ("B") and a Channel section on each outside edge. Angle sections rivet the stringers in place. A decorative guardrail, two angle sections 18" apart riveted by lattice bars, is bolted to the vertical members and the end posts.

This is the only Queen Post by Minneapolis Steel and Machinery Company on the Main Canal. Another is stockpiled in Section 18, T. 19 N., R. 58 E., and will likely be relocated on the canal in the future. The historic record indicates that only 2 Queen Posts were built by this company, but there may have been more. A 51' Minneapolis Steel Queen Post was removed from Station 1610 (where 510-0.7 11-C is now located.) The historic records show a 50' at that site, but the plans did not show any 50' ones to be built. Instead, the drawing shows a 52' to be at 1610, but it was to have been a 4 panel instead of three.

NARRATIVE HISTORY

(For general information on the Lower Yellowstone Project - USRS Main Canal please see the overview) The USRS Annual Project History Through 1909, Volumes I and II, describes this site as Station 2975, and indicates that a light steel truss 32' in length was built here. A. Y. Bayne and Company of Minneapolis got the contract for light structures. The Minneapolis Steel and Machinery Company, also of Minneapolis, got the contract for heavy trusses. This bridge is not consistent with the report, in that it was not built by Bayne, but by Minneapolis Steel and Machinery Co. (MSMC) The MSMC bridges all have lacing on the vertical members, as does this one, while A. Y. Bayne structures have lattice bars on the verticals, so this is not a case of builder misidentification. Plans for the heavy and the light trusses are included with the overview, and they call for lattice rather than lacing.

INTEGRITY *Diminished by a move and by partial loss of guardrail. A portion of the guardrail is missing from the south side. Timber stringers are rotting, and steel stringers are rusting. There is scour around abutment 2 and the shoulders. Sufficiency rating is 48.1 as of 2-1986.*

Altered *Reset in 1980* Unaltered Moved *Yes* Date *1980*

Summary of Move: *The historic record indicates that Minneapolis Steel erected a 40' Queen Post at Station 2549 on the section line between Sections 3 and 10 in Township 23 North and Range 59 East (223-0.5 67-C). In 1980 Richland County removed that structure (described in the bridge file as 41' long) and replaced it with a concrete Tee Beam 23½ feet wide. Apparently at the same time the county moved the old bridge to this site, as the bridge file reports that it was "reset" here in 1980 (See L42 223 000+0.500-1 067 for record of this bridge prior to its move).*

SIGNIFICANCE

The bridge is historically significant as one of the USRS original canal bridges, but moved properties are ineligible for listing on the National Register of Historic Places.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *1-14-88*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes _X_ No __

Results negative _X_

Comments: *Area disturbed by construction of the canal and the road.*

Was historical/architectural survey conducted around the structure?

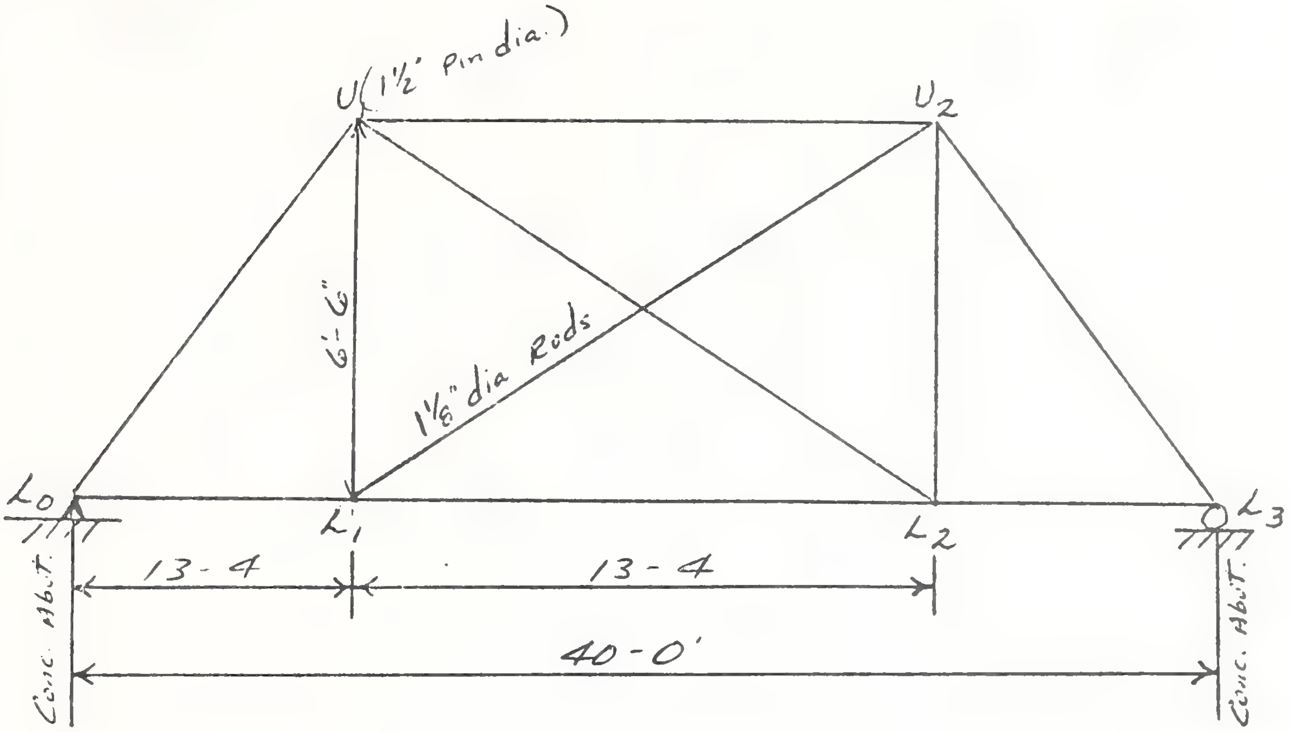
Yes _X_ No __

Results negative _X_

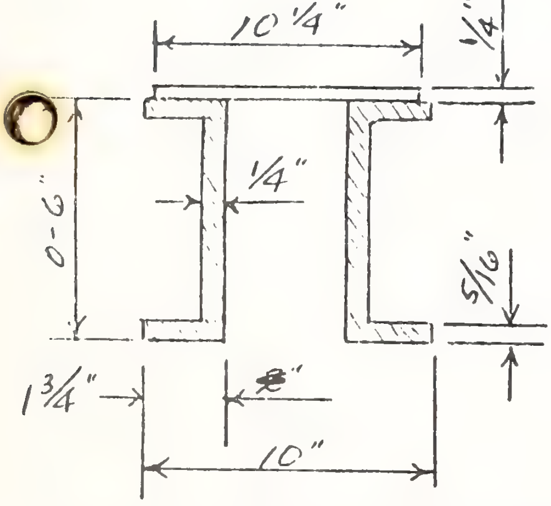
Comments: *House trailers are located on both sides of the canal along the road.*

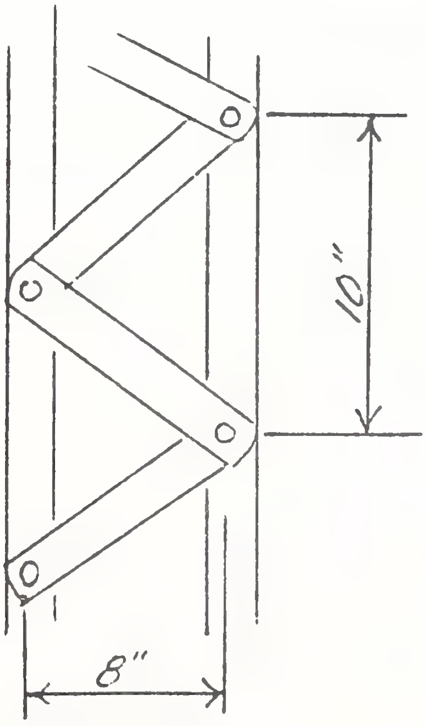
EV:3:mb:248/m

USR'S Main Canal   West of Fairview



From Center of upstream Truss to Center of downstream Truss = 18'-10"





End Posts & Top Chord

(L_0U_1; U_1U_2; U_2L_3).

(Riveted Connections)

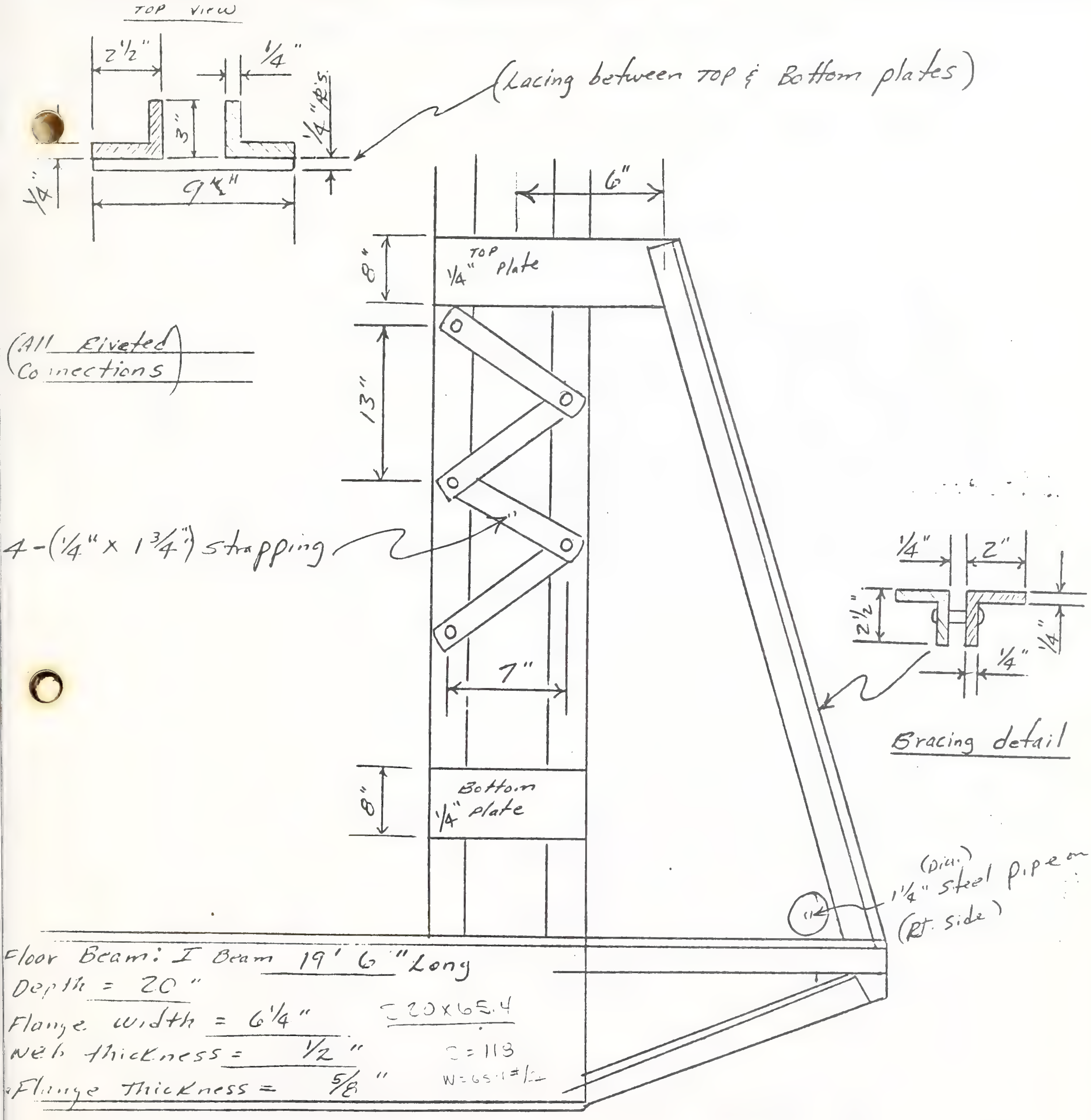
(Bottom side)

(1/4" x 1 3/4" strapping)

Lower Chord & Diagonals

$_0L_1$; L_1L_2; L_2L_3) 2- eye bars (3/4" x 2 1/2")

U_1L_2) –
U_2L_1) – } 1 1/8" (dia.) Rods



Floor Beam: I Beam 19' 6" Long
Depth = 20"
Flange width = 6¼"
Web thickness = ½"
Flange Thickness = ⅝"

I 20 x 65.4
S = 113
W = 65.4#/ft

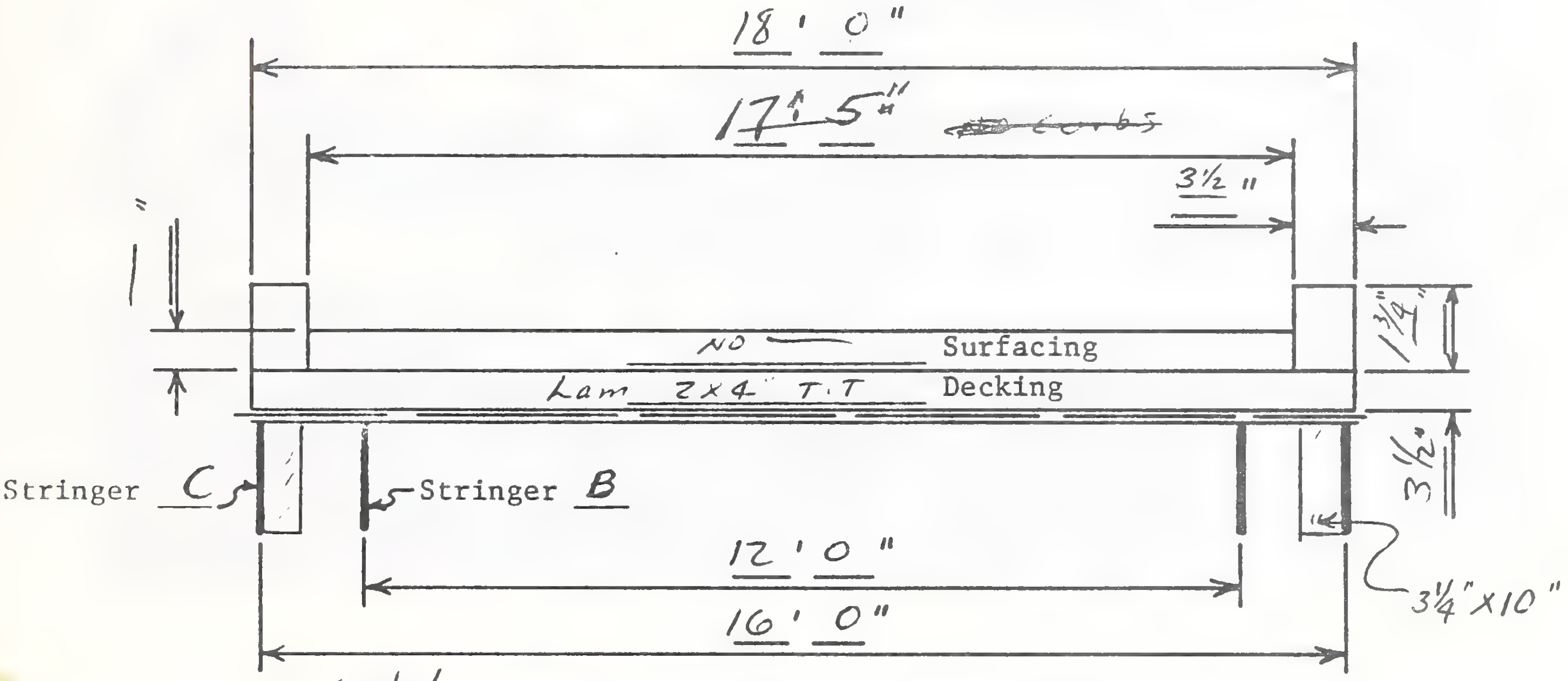
Vertical Members & outside Bracing.

STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet ____ of ____

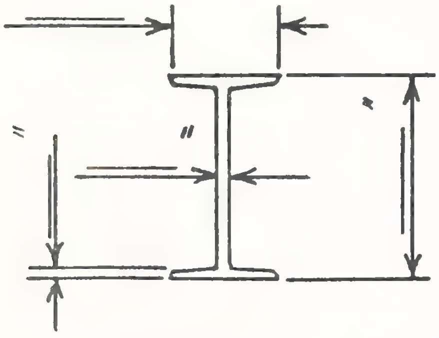
Structure Number (1) Span(s) Truss Inspector KQ.

Date 4-20-82

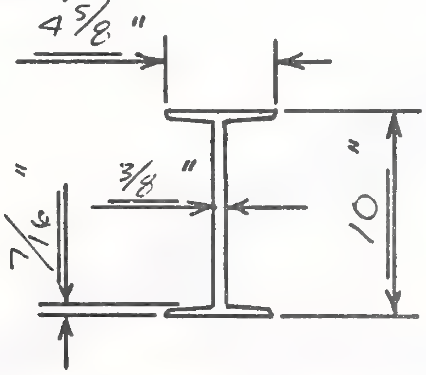


11 (steel Stringers) (total) Span Length 40' 0"

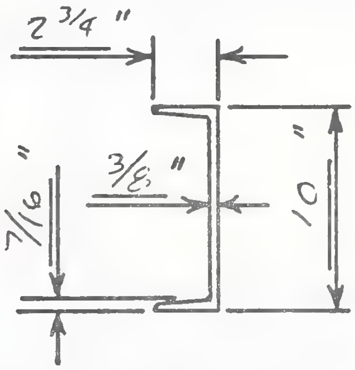
2- 3¼"X10" untreated Timber stringers



STRINGER "A"

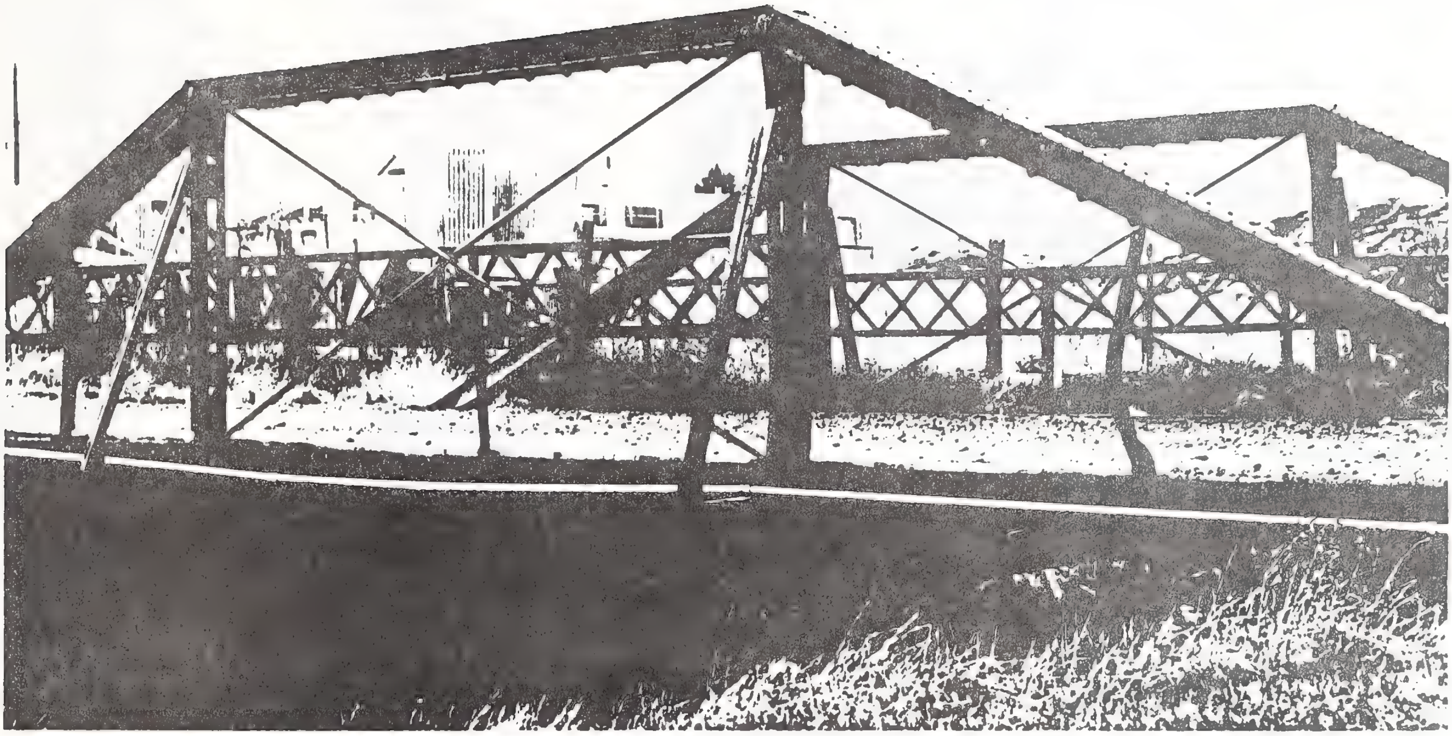


9- STRINGER "B"

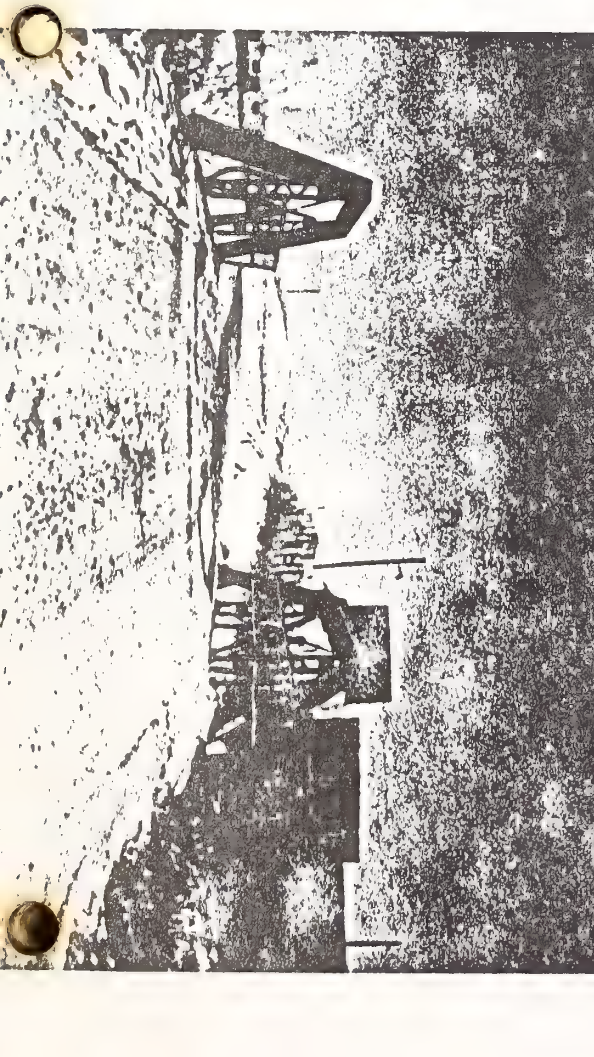


2 - STRINGER "C"

Comments: (Steel Stringers) are in Fair Condition.
untr Timb Stringers are in Poor Condition.

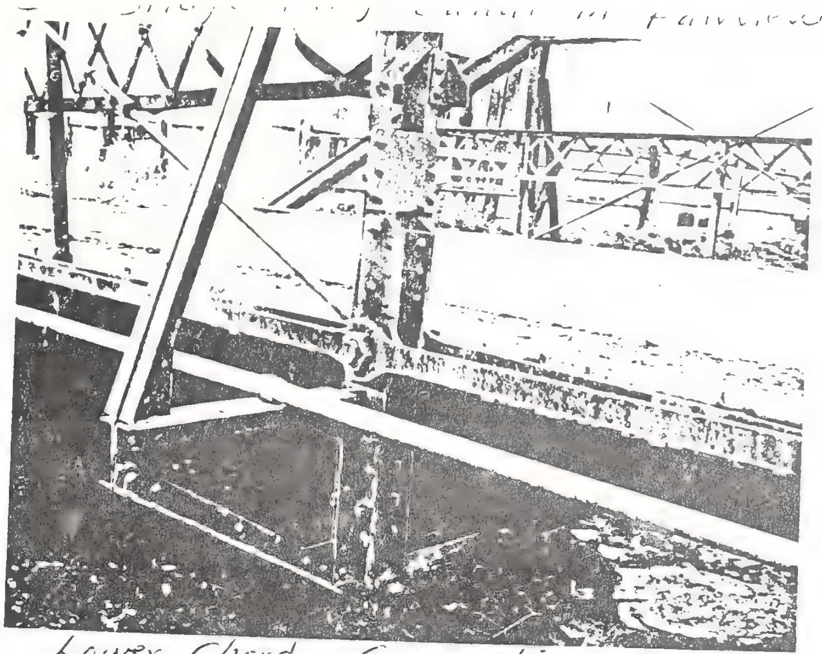


M42042 0.02 looking downstream USES Main Canal
Richland Co. 1-19-84



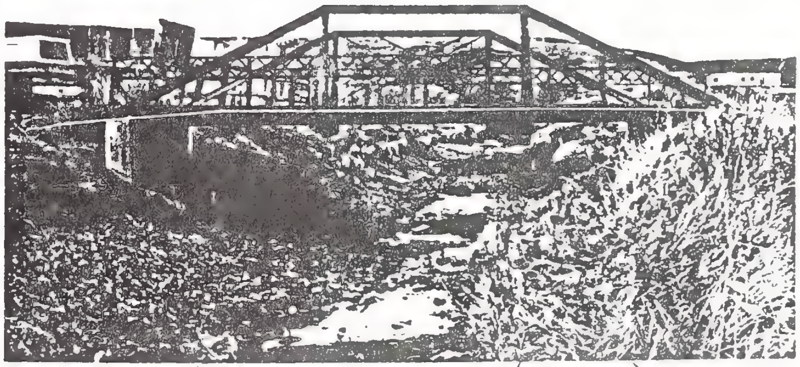
[illegible]
Richland Co 1-19-84

Bridge x-ing Canal in Fairview



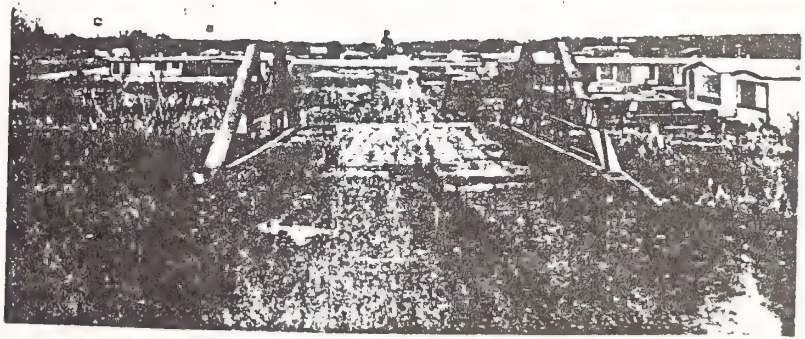
Lower Chord Connection

① New? Bridge x-ing Canal in Fairview

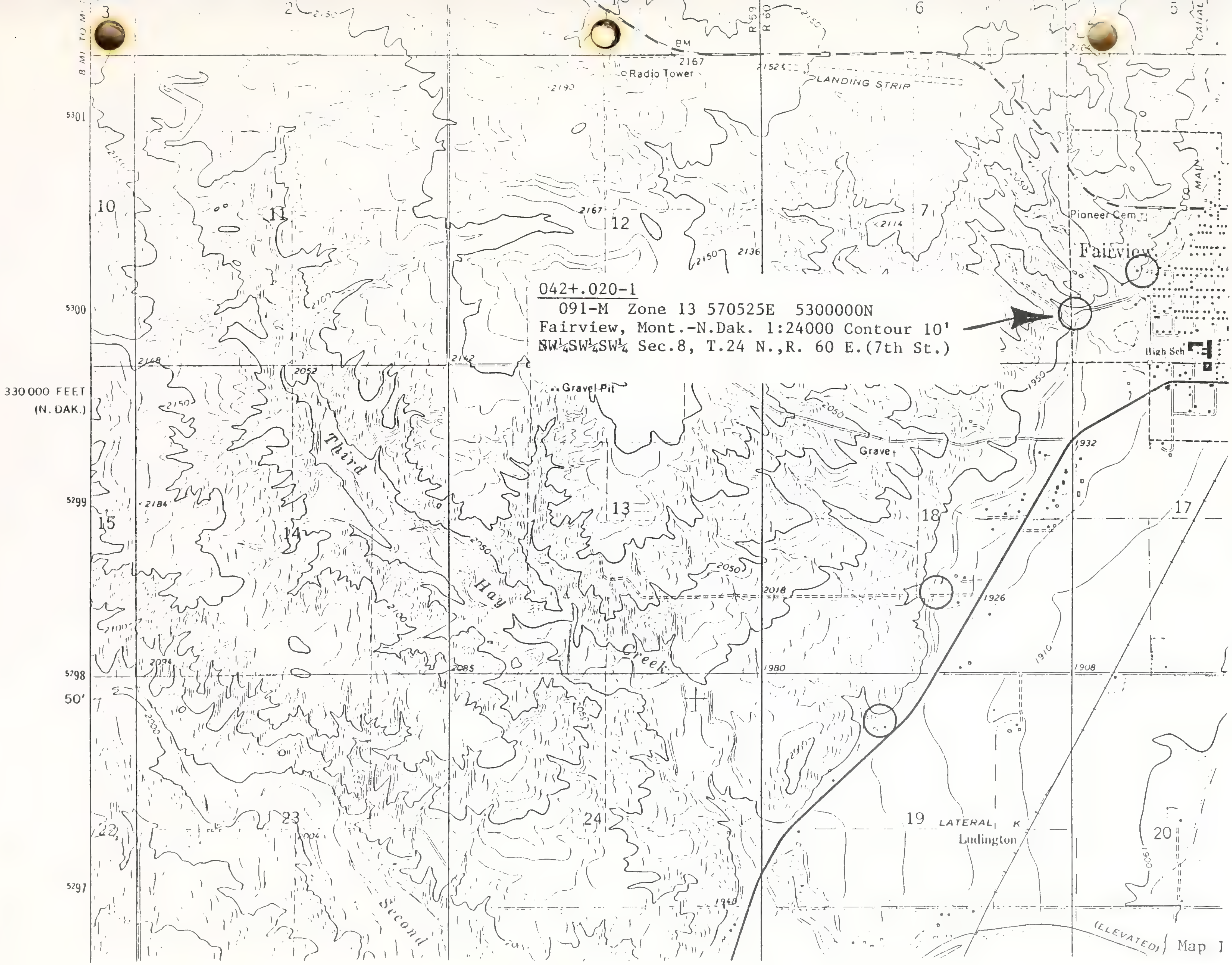


(Looking Downstream)

① Bridge x-ing Canal in Fairview



(Looking East)



042+.020-1

091-M Zone 13 570525E 5300000N

Fairview, Mont.-N.Dak. 1:24000 Contour 10'

NW¼SW¼SW¼ Sec.8, T.24 N., R. 60 E.(7th St.)

Map 1

MONTANA BRIDGE INVENTORY FORM

Site Number: *24 RL 185* Site Name: *USRS Main Canal - Fairview*
Structure Number: *M42 042 000+0.010-1 073-M* Year Built: *1908*
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *SE¼NW¼SW¼, Sec. 8 T. 24 N. R. 60 E.*
UTM Zone: *13, 570990 E. 5300220 N.*
Quad Name: *Fairview, Montana - North Dakota* Scale: *1:24,000*
County/City: *Richland* Route *042* Mile Crossing *Main Canal*

OWNERSHIP: MDOH ☐ County/City ☒ Federal ☐ Private ☐ Tribal ☐
Specify Fairview provides maintenance

PRESENT USE: *Bridge across the Main Canal or 4th Street, Fairview, on county road 042.*

BASIC BRIDGE (check as appropriate)

☐ Beam, Slab, Girder
☐ Suspension
☐ Arch
☐ Movable
☒ Truss
  ☒ Pin connected
  ☐ Rigid

MATERIALS

☐ Wood
☒ Metal
☐ Combination
☐ Stone
☐ Reinforced Concrete
☐ Prestressed Concrete

TYPE

☐ Deck
☒ Pony
☐ Through
☐ Combination

TRUSS DESIGN

☐ King Post
☒ Queen Post
☐ Howe
☐ Pratt
  ☐ Double Intersection
  ☐ Half Hip
  ☐ Parker
  ☐ Camelback
  ☐ Pennsylvania (Petit)
    ☐ Sub Struts
    ☐ Sub Ties
  ☐ Baltimore
☐ Lenticular
☐ Warren
  ☐ Verticles
  ☐ Polygonal Chord
  ☐ Double Intersecting
  ☐ Quadrangular
☐ K
☐ Other

Length *32* Width *18* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A. P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*

Builder/Contractor *A. Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 11, Frame 7.

NARRATIVE DESCRIPTION

This pin-connected Pratt Queen Post Pony Truss was erected by A. Y. Bayne and Company of Minneapolis, Minneapolis in 1908 for the U.S. Reclamation Service. It is a single span 32' in length, 18' wide, 6' high, with three panels 10'8" in length each. The bottom chord is forged steel eyebars; vertical members are 4 angle sections riveted together with lattice bars; counters are eyebars with turnbuckles. The inclined end posts and the top chord are of continuous plate riveted to two channel sections with lacing bars riveted to the bottom flanges. Knee braces of two angle sections are riveted to the floor beam and then attached to the verticals at the top between the angle sections. The substructure consists of I-beam floor beams under each vertical which support 12 stringers. These include 6-6" or "A" stringers, 2-10" or "B" stringers, and 4 channels or "C" 6" stringers. The lattice railing is missing.

NARRATIVE HISTORY

(For general information on the Lower Yellowstone Project - USRS Main Canal please see the overview) The USRS Annual Project History Through 1909, Volumes I and II, describe this site as Station 2985 where a light 32' steel truss was to have been built. A. Y. Bayne and Company of Minneapolis, Minnesota got the contract for light bridges. This bridge conforms to the history, but is not the original structure. A timber bridge replaced the original, then it too was replaced by this one about 1980. The 32' is the shortest version of the steel truss designed for the canal.

When the structure was first evaluated for safety in 1981, the lattice guardrail had already been removed. Loss of this rail greatly alters the appearance of the structure.

INTEGRITY *Poor, due to loss of original lattice guardrail. In 1984 the sufficiency rating was 58.1.*

Altered *Reset 1980* Unaltered Moved *Yes* Date *late 1970's or 1980*
Summary of Move: *This bridge came from 212-0.1 70-C, a county road south of Fairview, and here it replaced a timber bridge.*

SIGNIFICANCE

The bridge is historically significant as one of the original USRS Canal bridges. The loss of the distinctive lattice guardrail, however, seriously compromises its appearance, and renders it ineligible for listing on the National Register. It has also been moved.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 14, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes __ No _X_

Results negative __

Comments: *Construction of the canal and the road would have disturbed both sides of the canal. No original surfaces would be visible.*

Was historical/architectural survey conducted around the structure?

Yes __ No _X_

Results negative __

Comments:

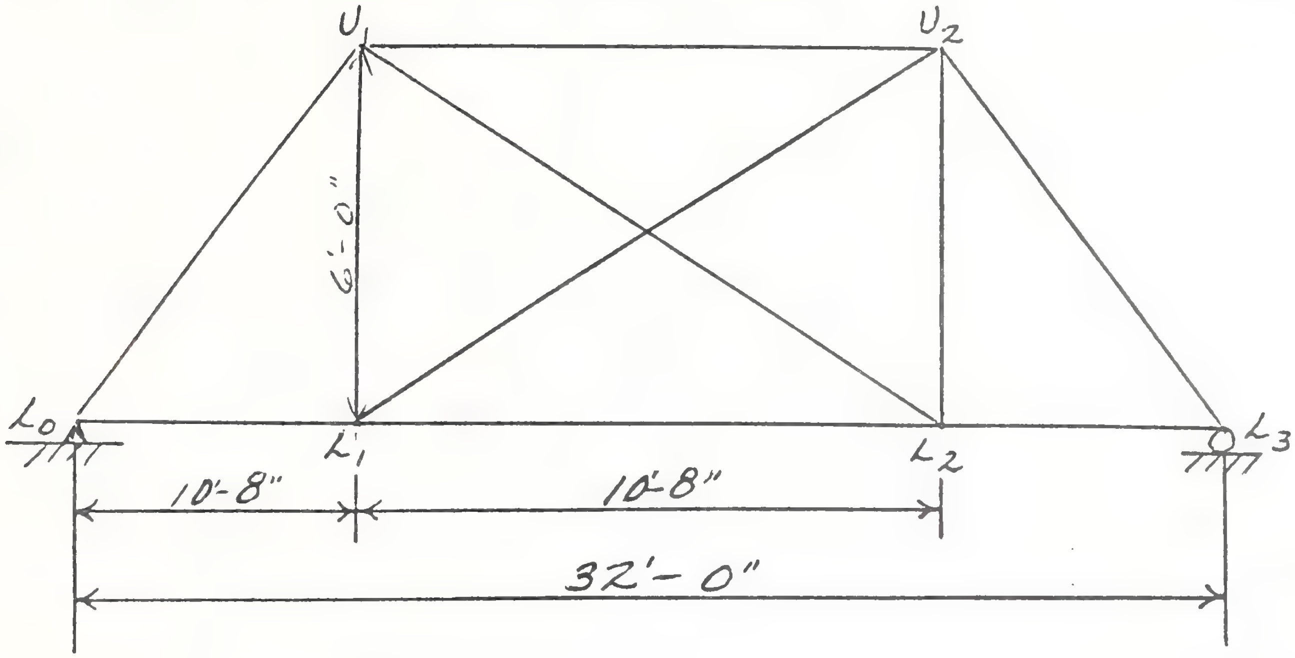
EV:3:mb:248/o

(West end of 4th st in Fairview MT.)

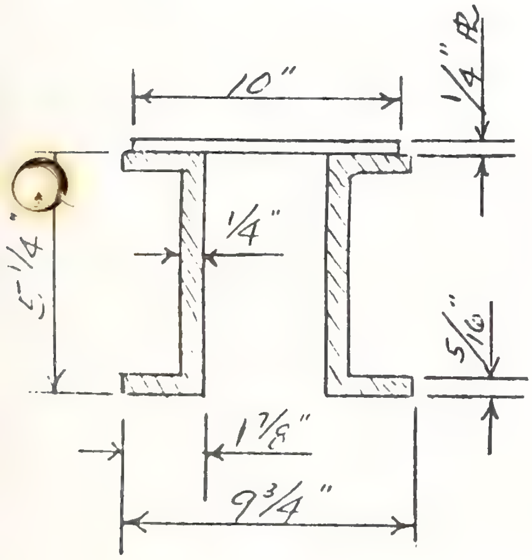
SK' Measurements:

Sheet 1 of 3

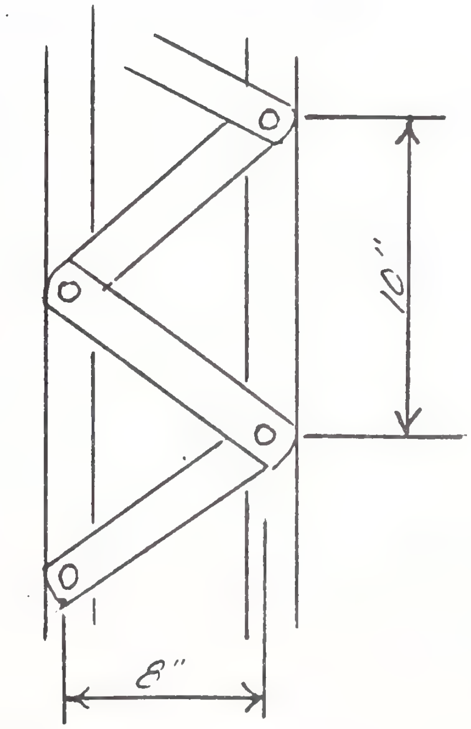
10-28-81



From Center of upstream Truss to Center of downstream Truss = 18'-10"



End Posts & Top Chord
(L_0U_1; U_1U_2; U_2L_3).



(Bottom side)
1/4" x 1 1/2" strapping

Lower Chord & Diagonals

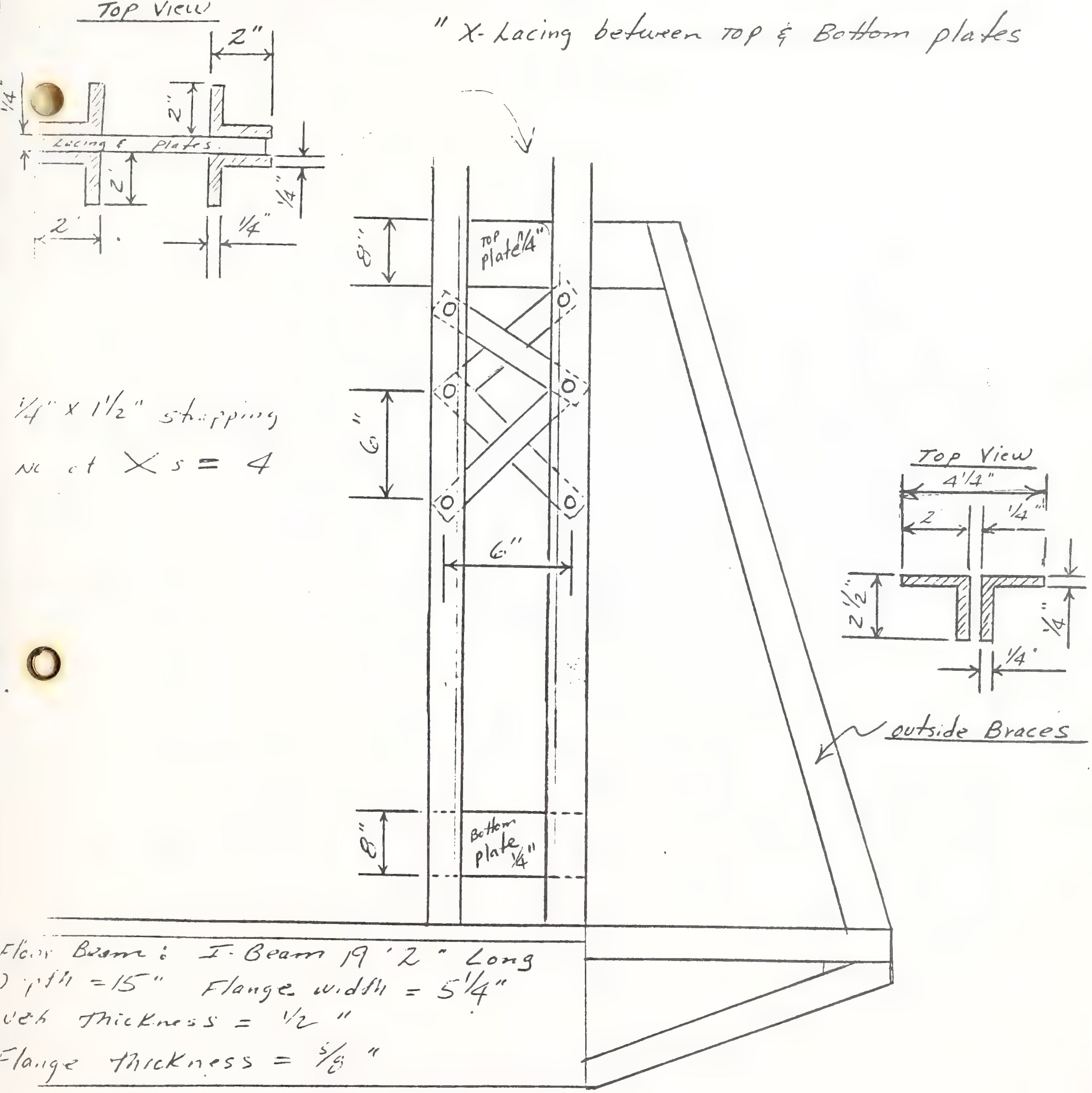
(L_0L_1; L_1L_2; L_2L_3) 2- eye bars 5/8" x 2".

(U_1L_2) - 1" sq Rod.

(U_2L_1) - 1" sq. Rod.

(west end of 4th sheet) Sheet 2 of 3

" X-Lacing between Top & Bottom plates



1/4" x 1 1/2" strapping

No of Xs = 4

Floor Beam: I-Beam 19 ' 2 " Long
Depth = 15" Flange width = 5 1/4"
Web Thickness = 1/2 "
Flange thickness = 5/8 "

Vertical Members & outside Bracing
(U1 L1 & U2 L2).

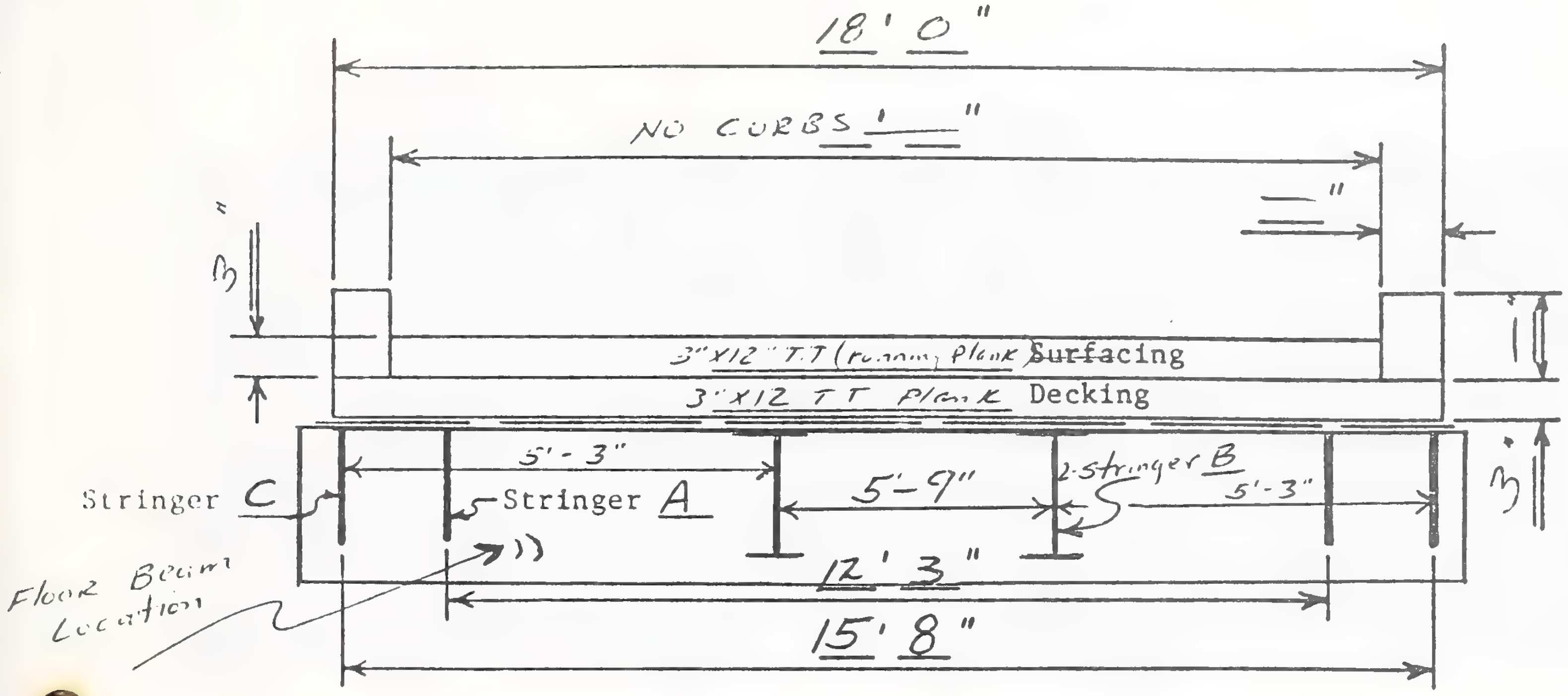
STRUCTURAL MEASUREMENTS FOR STEEL·STRINGER BRIDGES

Sheet 3 of 3

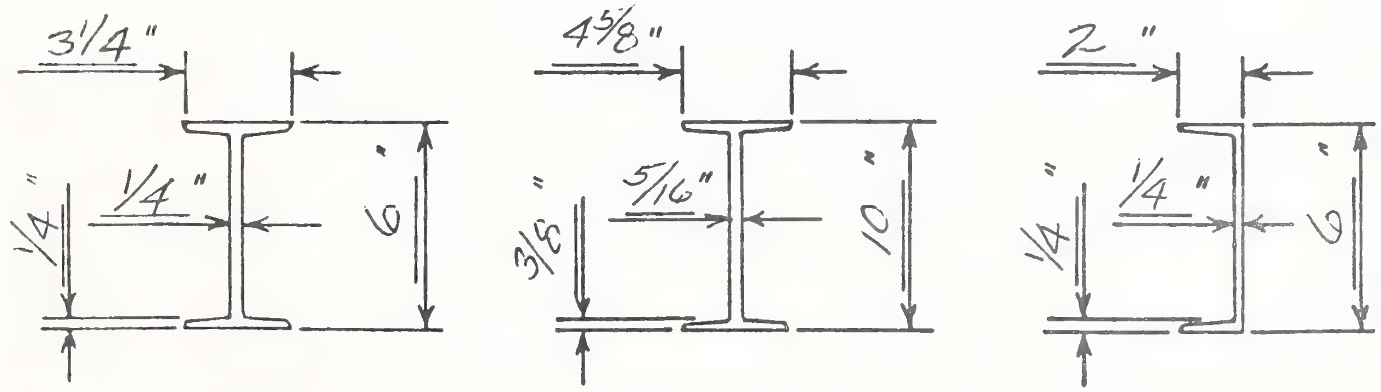
Structure Number M 42042 001 (west end of 4th street)   Span(s) No. 1

Inspector K.Q.

Date 10-28-81



12 Stringers (total)   Span Length 32' 0"

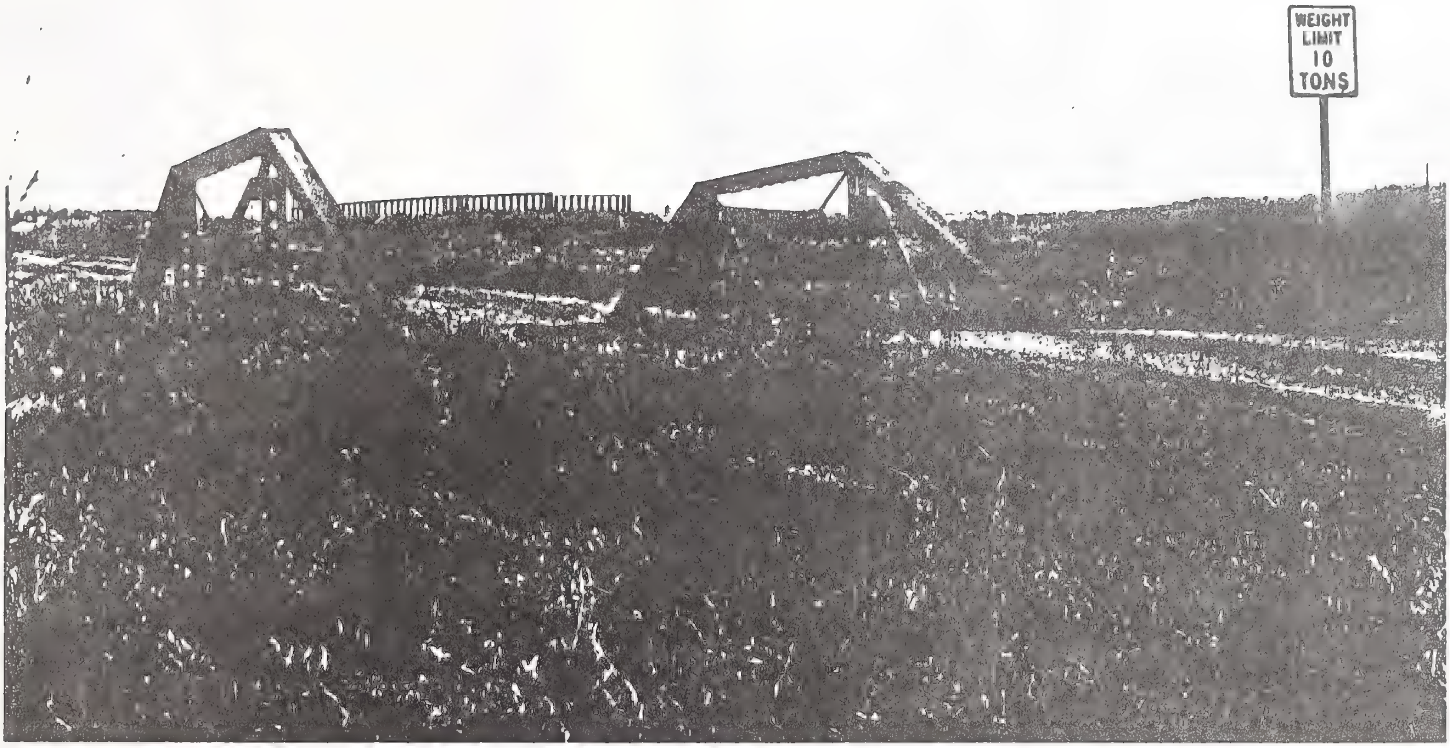


6- STRINGER "A"

2- STRINGER "B" (near ℄ of str.)

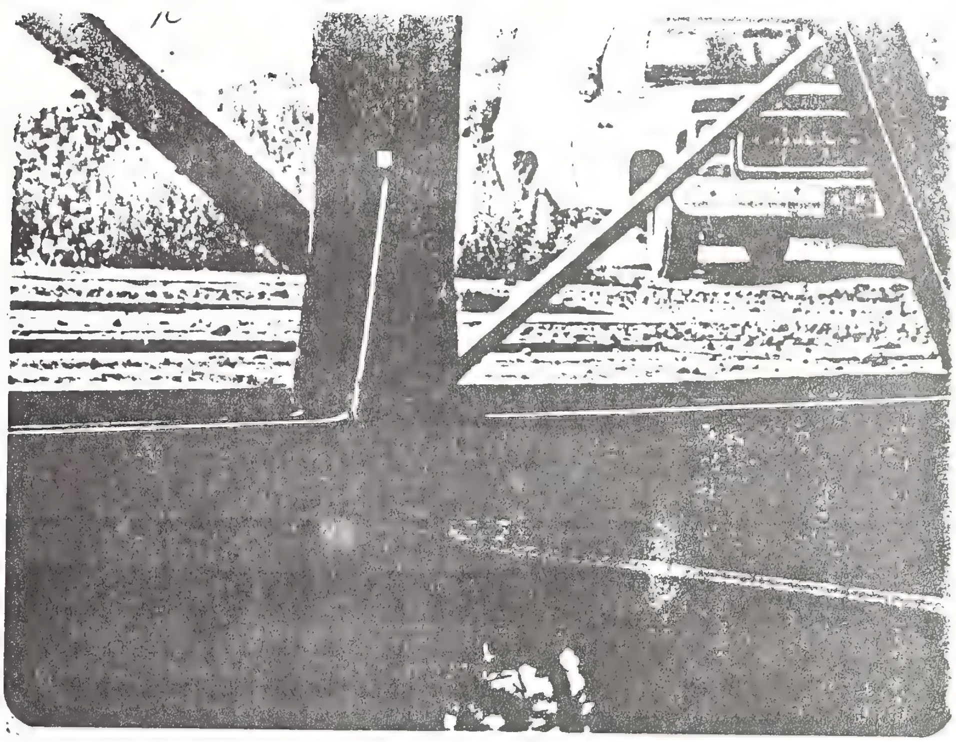
2~~#~~ STRINGER "C" 4 (on outside ~~edges~~) & 2 on ℄ of str.

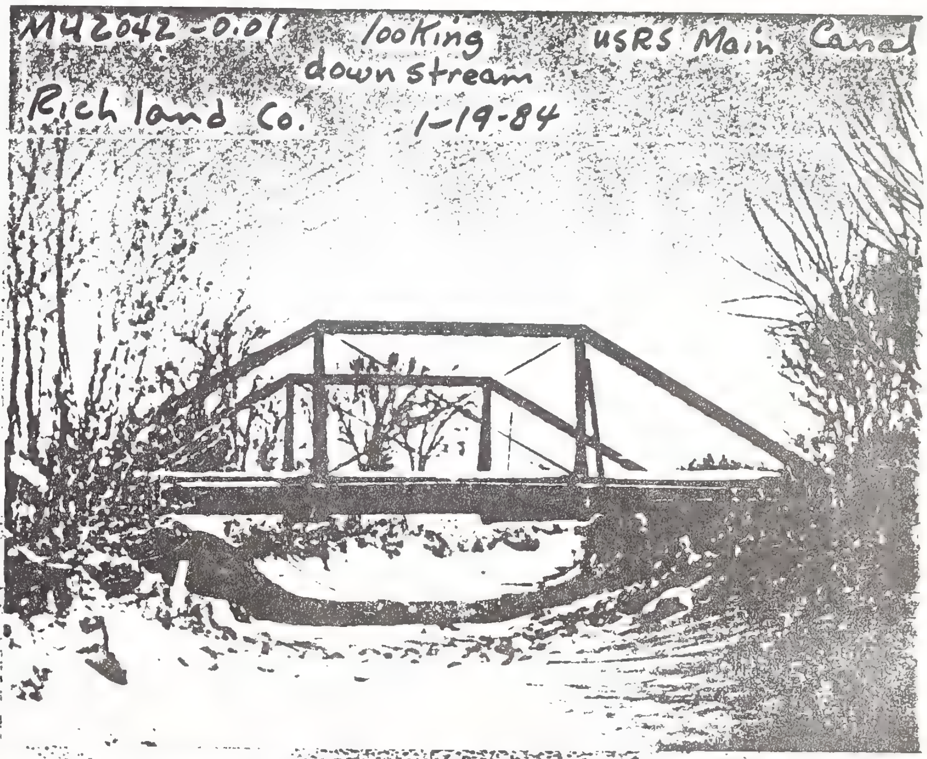
Comments: stringers are in good condition.


WEIGHT
LIMIT
10
TONS

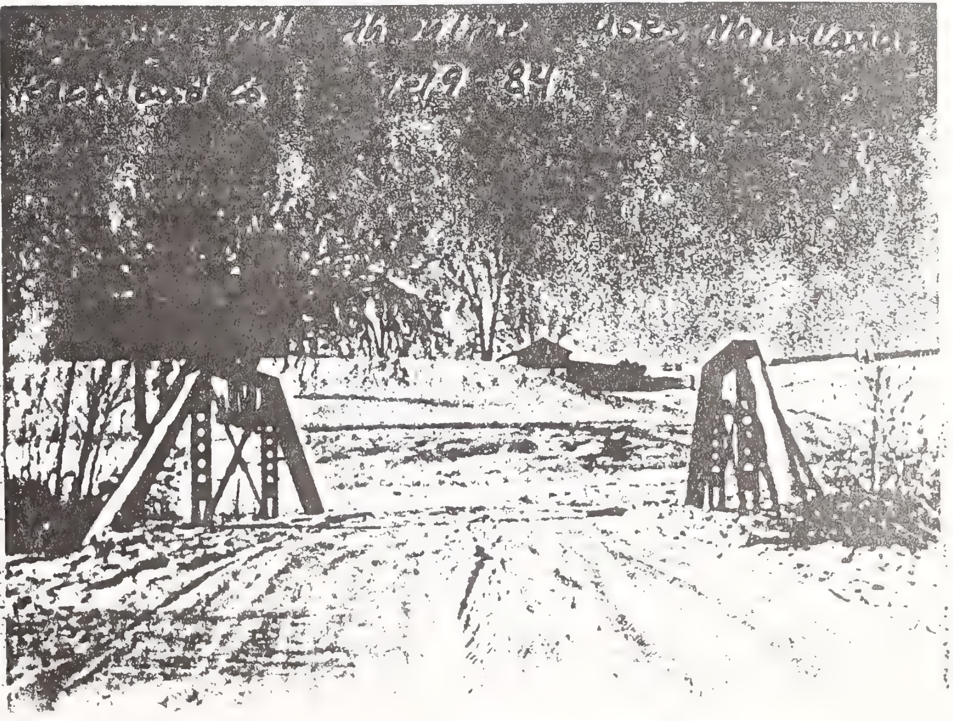
10

11

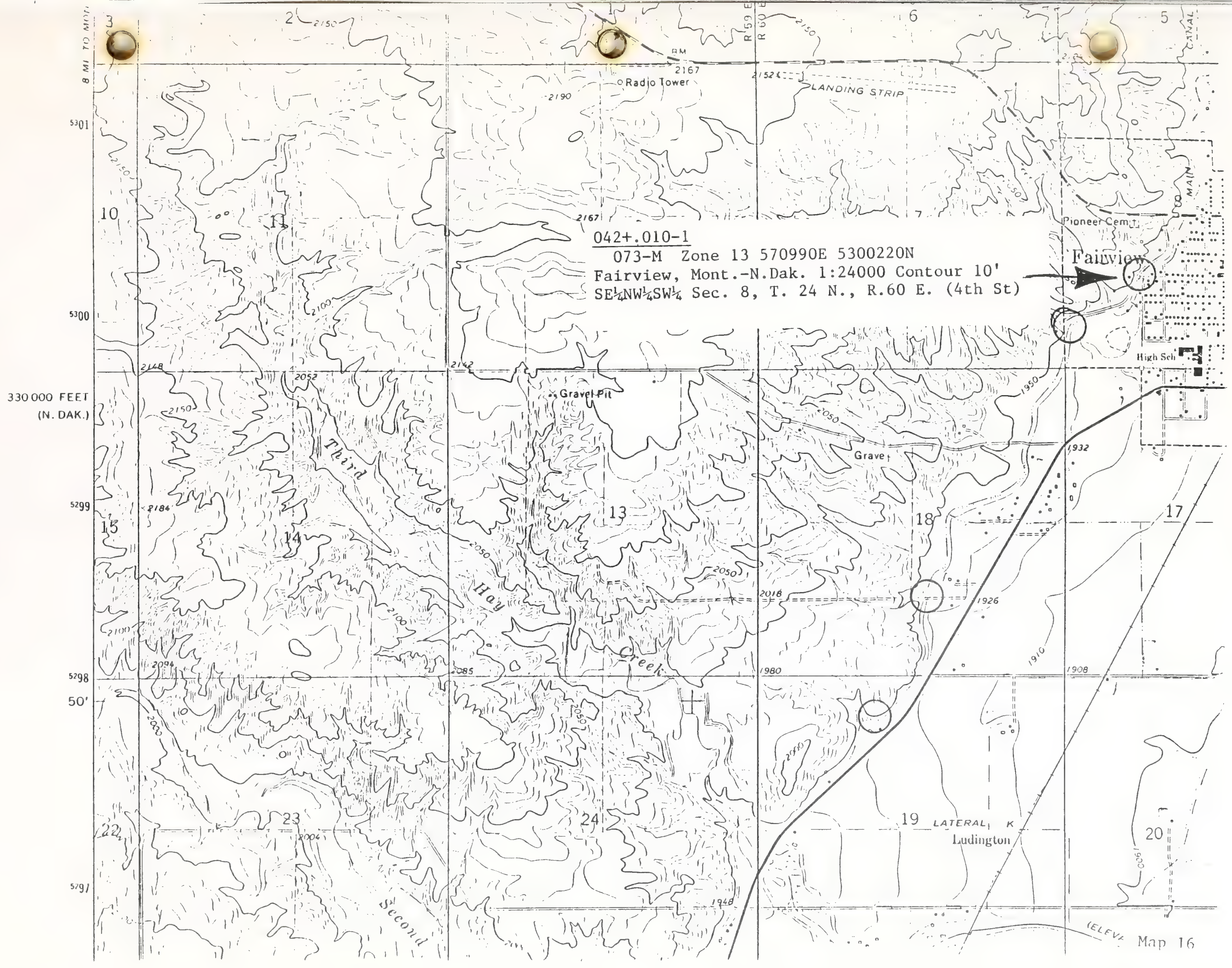




M42042-0.01 looking down stream USRS Main Canal
Richland Co. 1-19-84



[illegible] USRS Main Canal
Richland Co. 1-19-84



042+.010-1

073-M Zone 13 570990E 5300220N

Fairview, Mont.-N.Dak. 1:24000 Contour 10'

SE¼NW¼SW¼ Sec. 8, T. 24 N., R.60 E. (4th St)

Map 16

MONTANA BRIDGE INVENTORY FORM

Site Number: *24RL186* Site Name: *USRS Canal Bridge, 1 Mi. N. Fairview*
Structure Number: *L42 559 000+0.300-1 088-C* Year Built: *1908*
Evaluation Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *Center N. Line, Sec. 5, T. 24 N., R. 60 E.*
UTM Zone: *13, 571220, E. 5301825 N.*
Quad Name: *Fairview, Mont - N. Dak.* Scale: *1:24,000*
County/City: *Richland* Route *559* Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Richland

PRESENT USE: *USRS Canal Bridge, rural access*

BASIC BRIDGE (check as appropriate)

__ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
X Truss
  X Pin connected
  __ Rigid

MATERIALS

__ Wood
X Metal
__ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

__ Deck
X Pony (Wood Plank Deck and Running Boards)
__ Through
__ Combination

TRUSS DESIGN

__ King Post
X Queen Post
__ Howe
__ Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
__ K
__ Other

Length *34'* Width *17.7'* No. spans *1* No. panels *3*
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A.P. Davis, Chief Engineer*
Fabricator *Carnegie Steel*
Builder/Contractor *A.Y. Bayne & Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 4, Frames 16, 17 & 18

NARRATIVE DESCRIPTION

This steel pony truss, a pin-connected Queen Post single-span 34' has three panels of 11'-4" each. It stands 6' high and is 17.7' wide. The lower chord is composed of forged steel eyebars. The top chord and inclined posts are of continuous steel plate riveted to two channel sections that have been riveted together with lacing bars along the bottom flanges. The diagonal counters are eyebars with turnbuckles. The vertical members are four angle sections riveted together with lattice bars. Knee braces stabilize the verticals. They are of two angle sections riveted together. A guardrail of two angle sections is latticed together in an 18" pattern. Portions of the rail are missing.

NARRATIVE HISTORY

Station 3067, this location was to have had a combination wood and steel truss, until plans changed, apparently deleting the combination bridges. A light 34' steel truss was then scheduled here, the last location on the canal to have a truss.

INTEGRITY *Poor. A portion of the lattice guardrail is missing. The sufficiency rating was 29.3 in 1986.*

Altered *X* Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

The bridge is historically significant as an original USRS Bridge. This is the last station on the canal scheduled for a steel truss bridge. Much of its lattice guardrail is gone, diminishing its integrity.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 27, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Canal, road construction and field leveling have altered the surface so as to preclude finding intact resources.*

Was historical/architectural survey conducted around the structure?

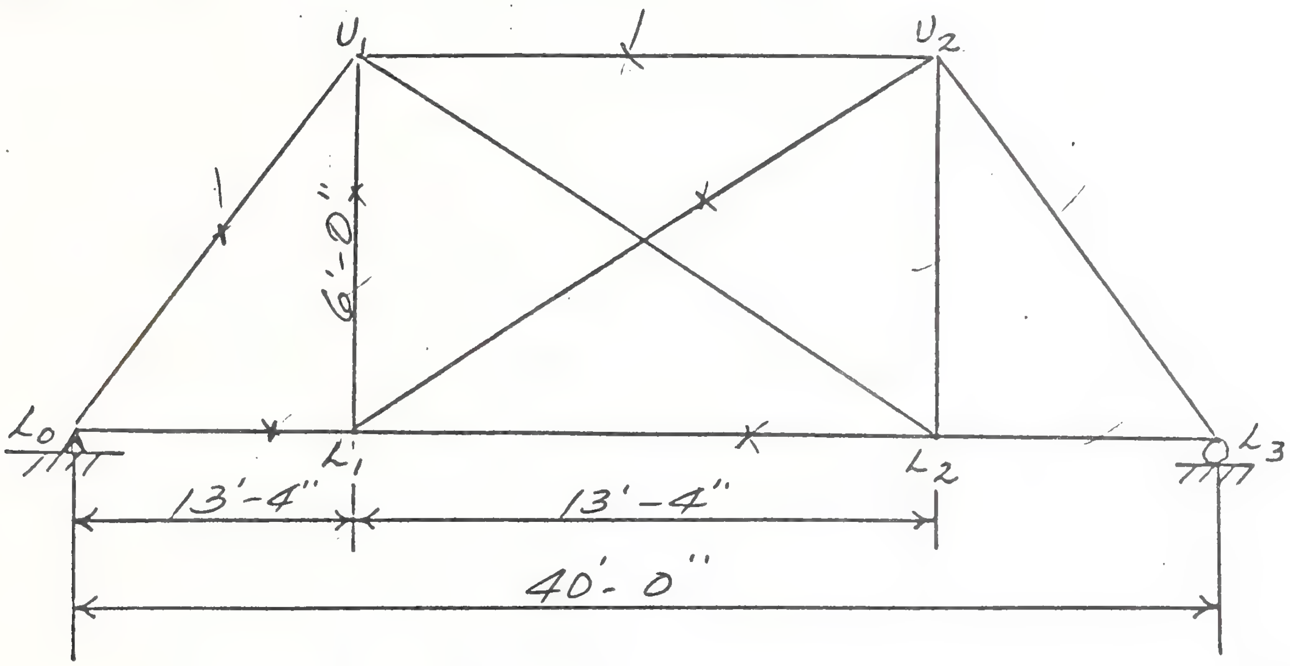
Yes _X_ No __

Results negative _X_

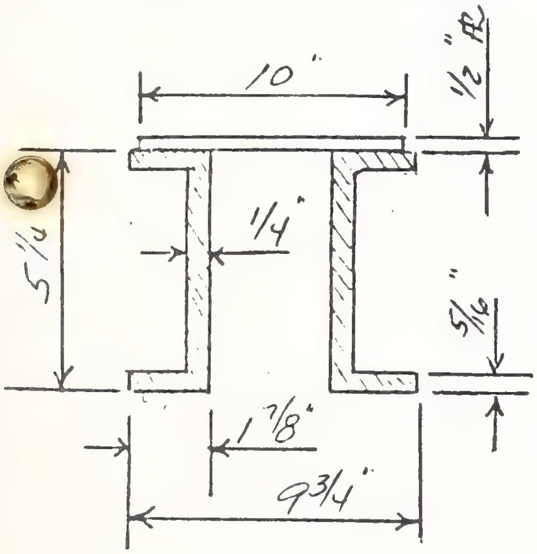
Comments: *Some farm buildings are more than 300' away. A grain storage bin sits near the bridge.*

EV:3:cm:248/f

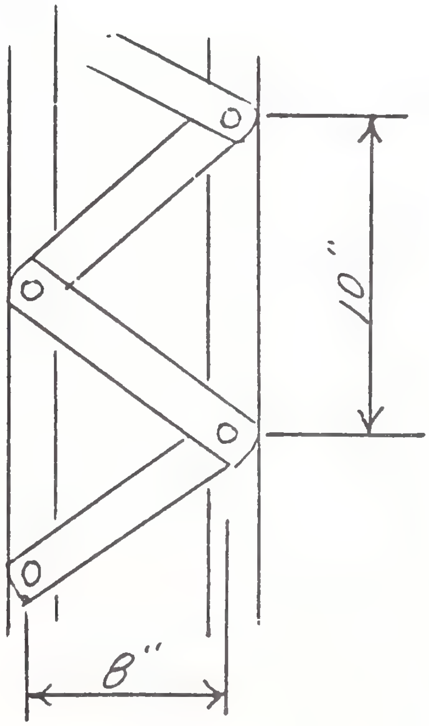
559 0004 0.3001 USRS Main Canal 1 of 3



From Center of upstream Truss to Center of downstream Truss = 19'-0"



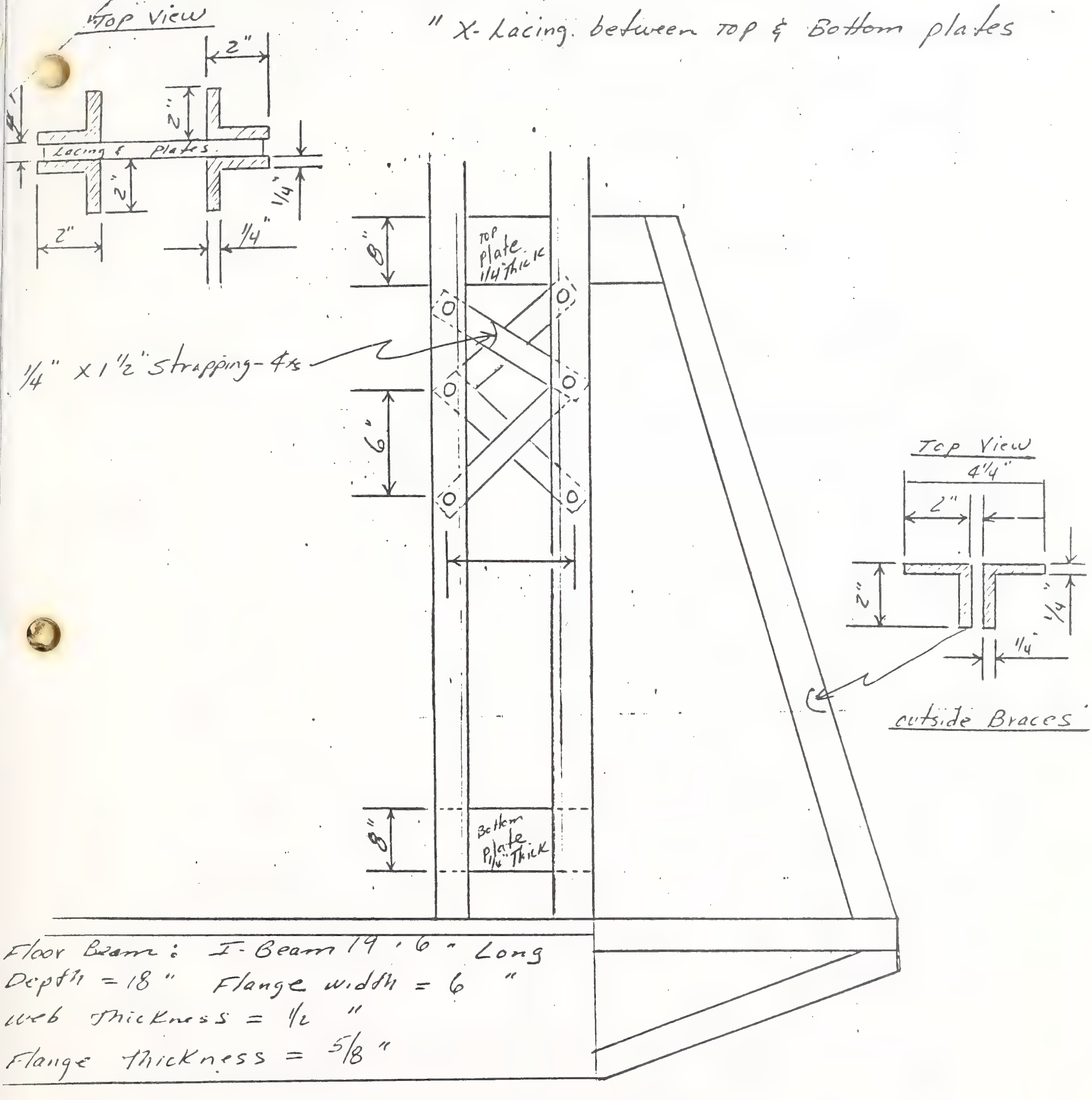
End Posts & Top chord
($L_0 U_1$; $U_1 U_2$; $U_2 L_3$).



(Bottom side)
1/4" X 1½" strapping

Lower Chord & Diagonals

($L_0 L_1$; $L_1 L_2$; $L_2 L_3$) 2- eye bars 5/8" × 2½".
($U_1 L_2$) – 1" square Rod
($U_2 L_1$) – 1" square Rod



Floor Beam: I-Beam 19 ' 6 " Long
Depth = 18 " Flange width = 6 "
web Thickness = 1/2 "
Flange thickness = 5/8 "

Vertical Members & outside Bracing

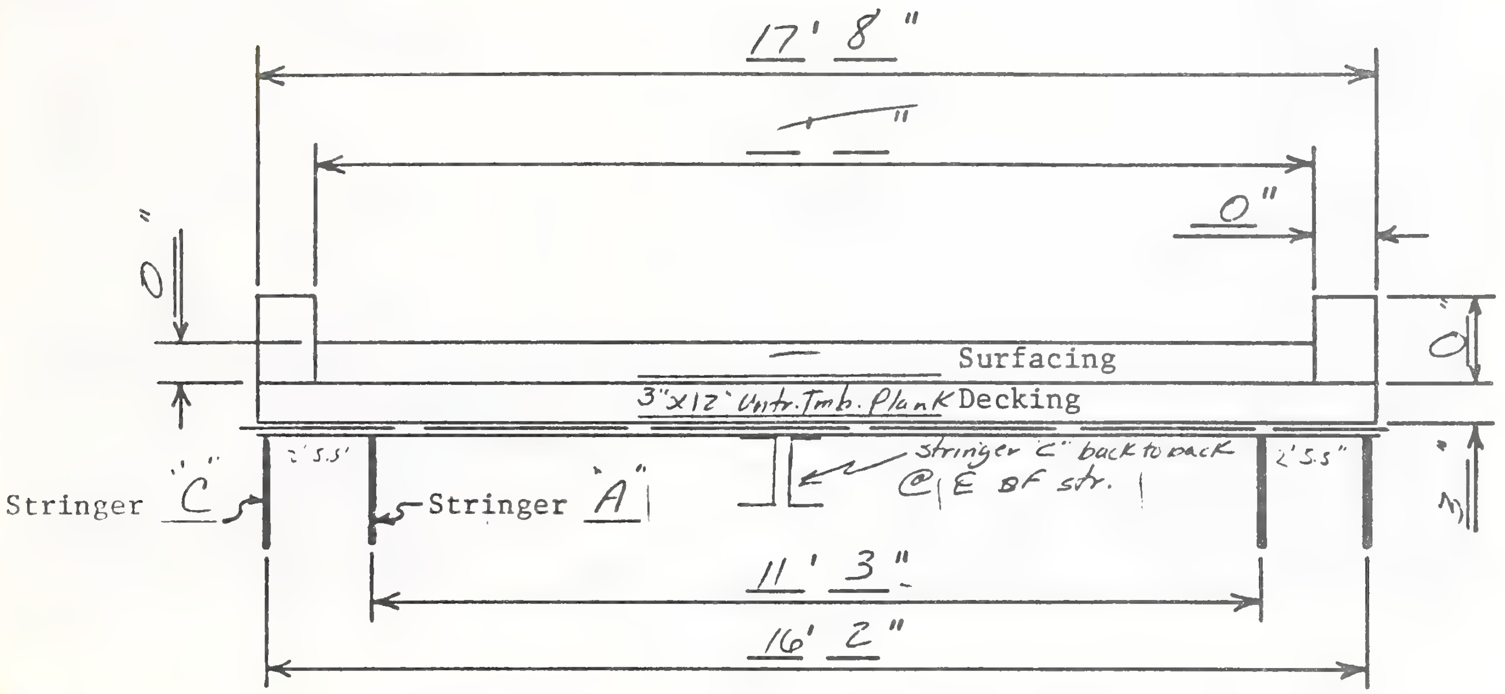
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 3 of 3

Structure Number L42559 00010.3001 Span(s) 1

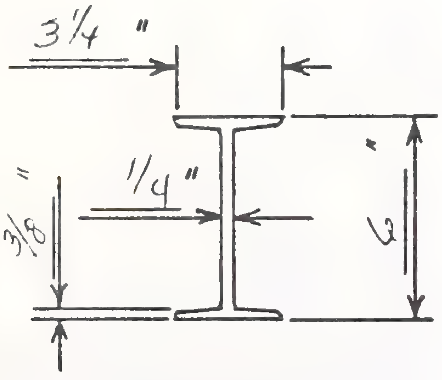
Inspector K.Q.

Date 10-15-84

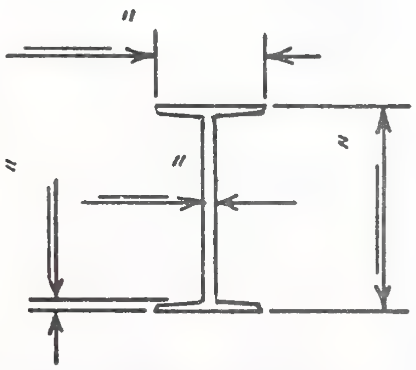


10 Stringers (total)

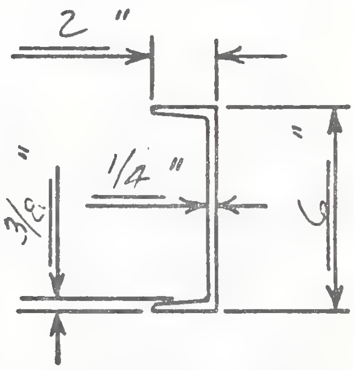
Span Length 40' 0"



STRINGER "A"

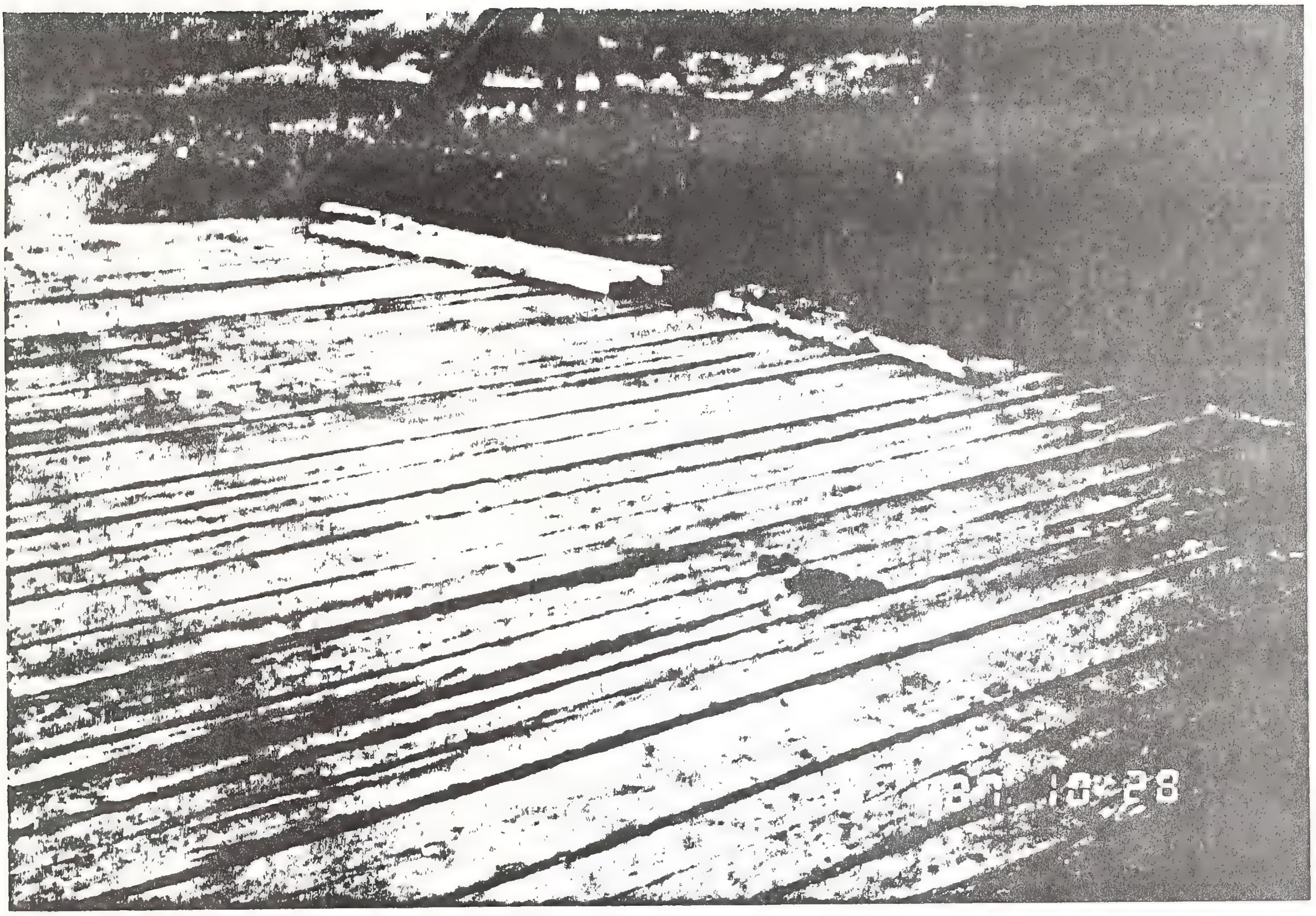


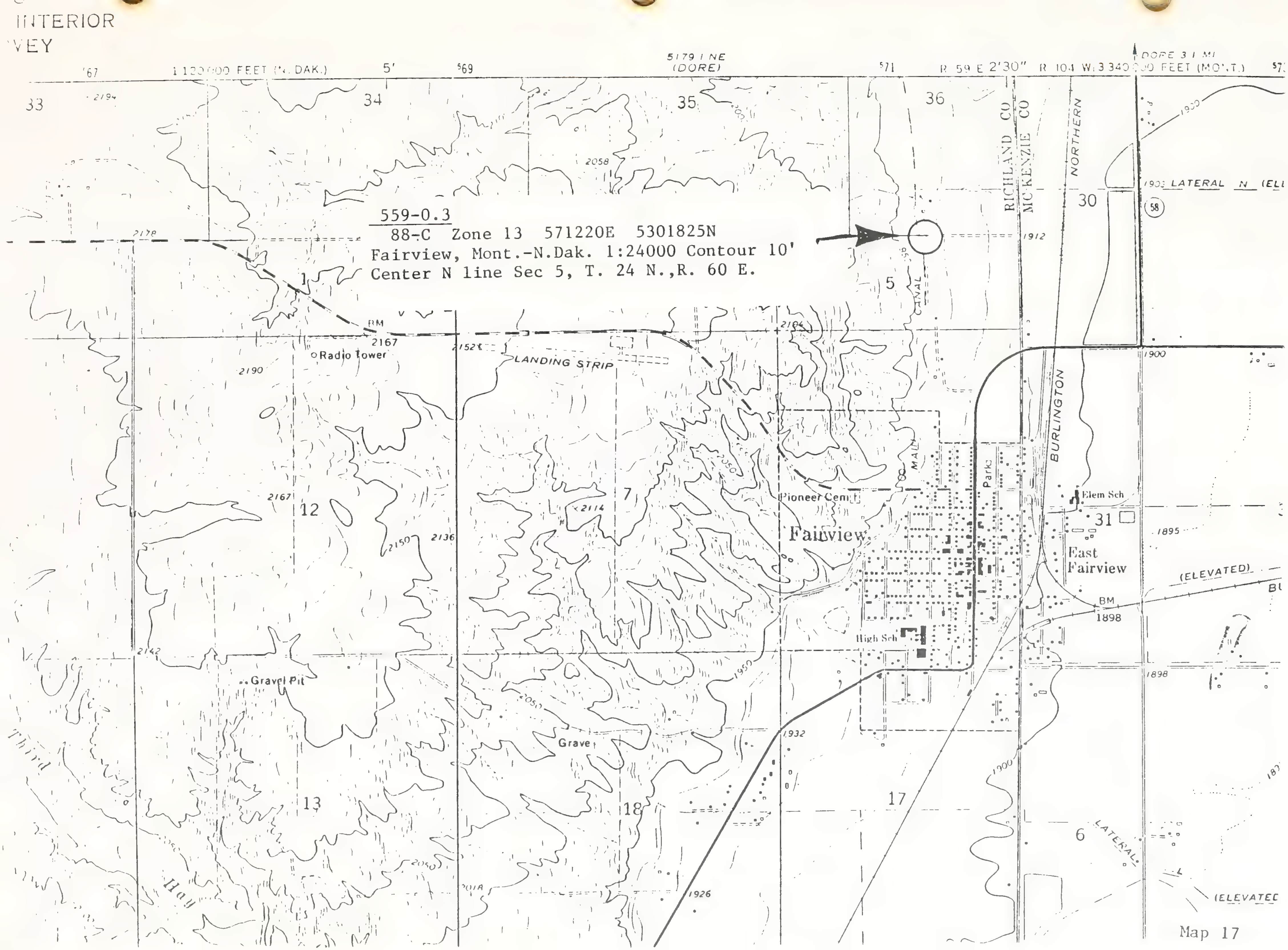
STRINGER "B"



STRINGER "C"

Comments: Dbl. channels @ ℄ of str., stringers are in fair condition (light rust). See photo for Floor beam connection to stringers.


'87 10 28



559-0.3

88-C Zone 13 571220E 5301825N

Fairview, Mont.-N.Dak. 1:24000 Contour 10'

Center N line Sec 5, T. 24 N.,R. 60 E.

Map 17

MONTANA BRIDGE INVENTORY FORM

Site Number: *24 RL 187* Site Name: *Main Canal Steel Stringer*
Structure Number: *L42 239 000+02001 074-C* Year Built: *1908 or 21*
Evaluation Determined Eligible ___
Ineligible ___
Date ___

LOCATION: *NW¼NE¼NW¼, Sec. 36 T. 25 N. R. 59 E.*
UTM Zone: *13, 571240 E. 5303600 N.*
Quad Name: *Dore, Montana - North Dakota* Scale: *1:24,000*
County/City: *Richland* Route Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City X Federal __ Private __ Tribal __
Specify Richland

PRESENT USE: *Canal Bridge*

BASIC BRIDGE (check as appropriate)

- X Beam, Slab, Girder
- __ Suspension
- __ Arch
- __ Movable
- __ Truss
  - __ Pin connected
  - __ Rigid

MATERIALS

- X Wood
- X Metal
- X Combination
- __ Stone
- __ Reinforced Concrete
- __ Prestressed Concrete

TYPE

- X Deck
- __ Pony
- __ Through
- __ Combination

TRUSS DESIGN

- __ King Post
- __ Queen Post
- __ Howe
- __ Pratt
  - __ Double Intersection
  - __ Half Hip
  - __ Parker
  - __ Camelback
  - __ Pennsylvania (Petit)
    - __ Sub Struts
    - __ Sub Ties
  - __ Baltimore
- __ Lenticular
- __ Warren
  - __ Verticles
  - __ Polygonal Chord
  - __ Double Intersecting
  - __ Quadrangular
  - __ K
- __ Other

Length *28'* Width *18'* No. spans *1* No. panels
Abutments *concrete* No. Piers *0* Type
Designer/Engineer *Possibly a U.S. Reclamation Service, Francis E. Weymouth, Project Engineer*
Fabricator *Likely Carnegie Steel*
Builder/Contractor *A. Y. Bayne was scheduled to erect a 26' steel stringer here.*

PHOTOGRAPHIC RECORD

Roll 11, Frames 8 and 9.

NARRATIVE DESCRIPTION

There are 9 steel stringers (10" I beams type "A" and "C") holding a plank deck. There are no knee braces or railings as indicated on the USRS specifications.

NARRATIVE HISTORY

Specifications 136, drawing 2 of 6 show the plans for the steel stringers at Station 3197 and on lateral KK. Likely these were used for all steel stringers. Historic text shows a 22¼' heavy steel at 3197 and a light steel 26' one here at Station 3122, A. Y. Bayne was scheduled to construct it.

INTEGRITY *The loss of the hand railing greatly alters the appearance. The sufficiency rating in 1984 was only 22.5.*

Altered X Unaltered Moved Date
Summary of Move:

SIGNIFICANCE

As a canal stringer, this bridge is probably the original, and likely the only surviving steel stringer on the Montana portion of the Main Canal. The loss of the railing so greatly alters it that it would be ineligible for the National Register.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Edrie Vinson* Date: *January 14, 1988*
Montana Department of Highways

Was Archaeological survey conducted around the structure?

Yes X No __

Results negative X

Comments: *Land disturbed by canal and road construction.*

Was historical/architectural survey conducted around the structure?

Yes _X_ No __

Results negative _X_

Comments: *A structure was removed between 1984-86. Modern structures are present now.*

EV:3:mb:248/n

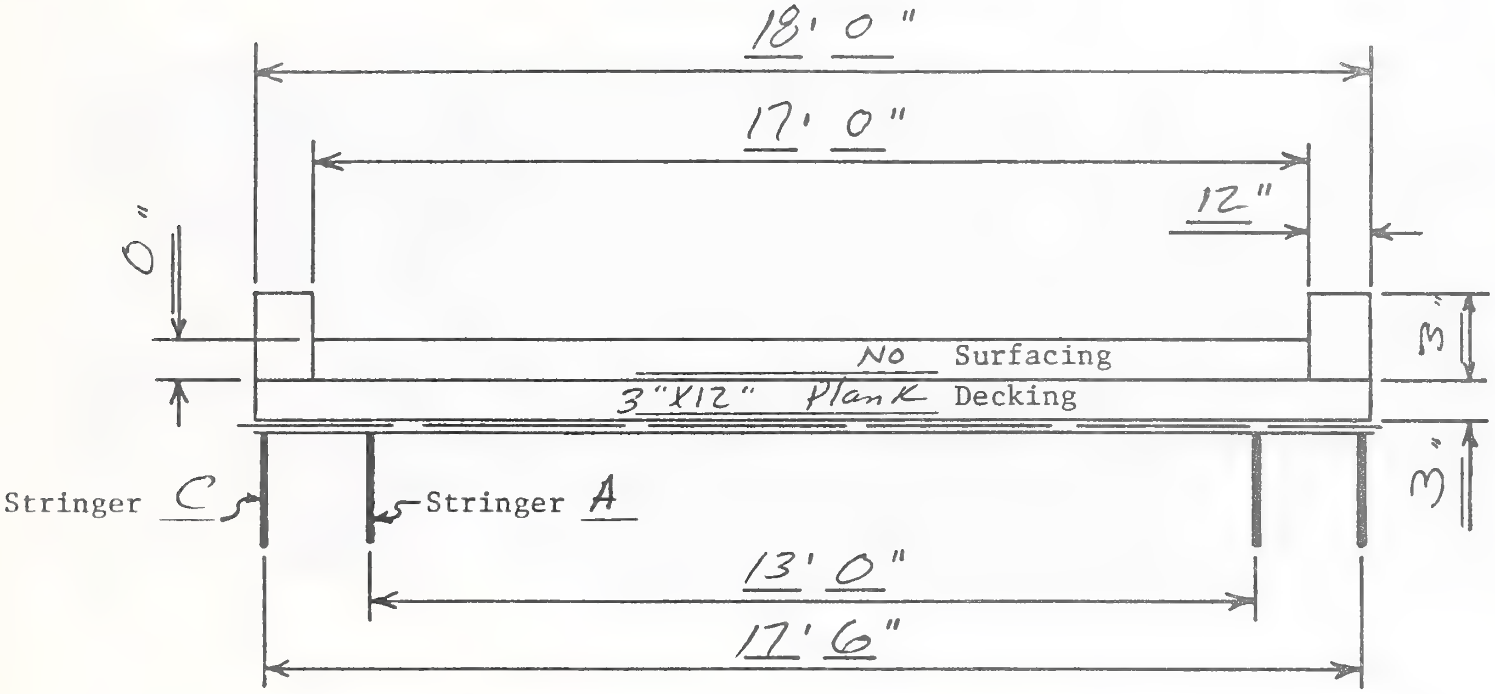
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet 1 of 1

Structure Number L42075 000+0.210 Span(s) #1

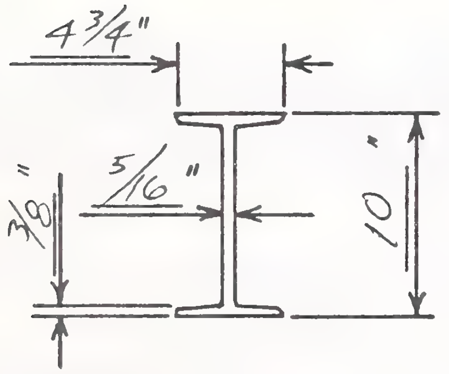
Inspector K.Q.

Date 7-27-79

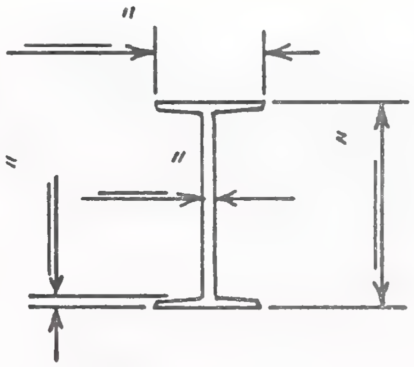


9 Stringers (total)

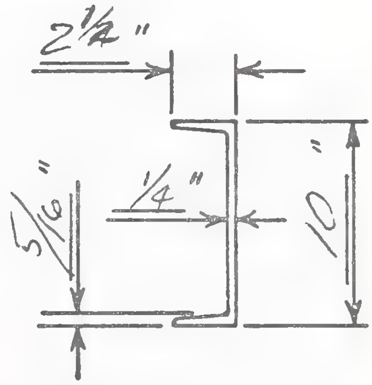
Span Length 28' 0"



STRINGER "A"

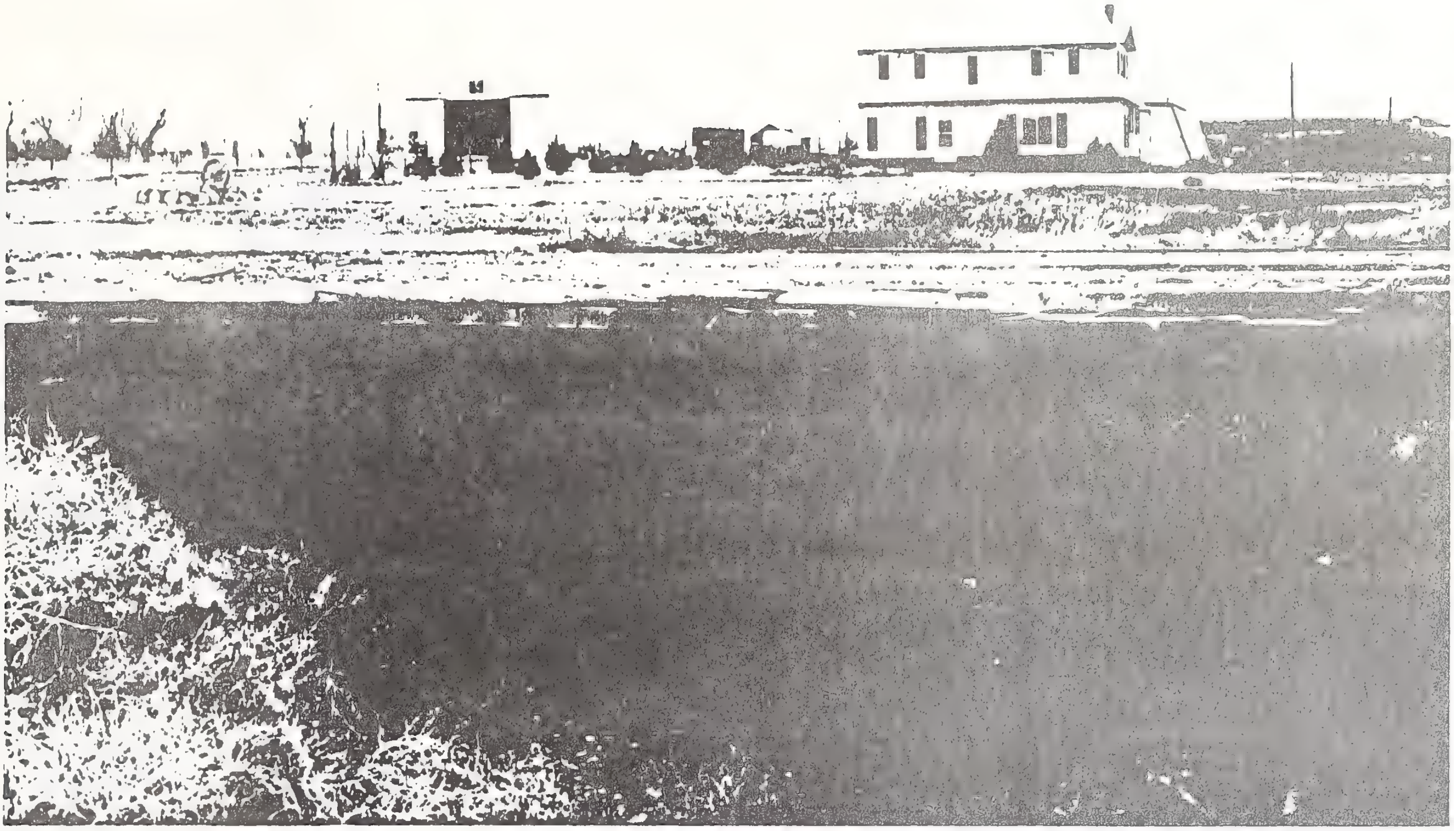


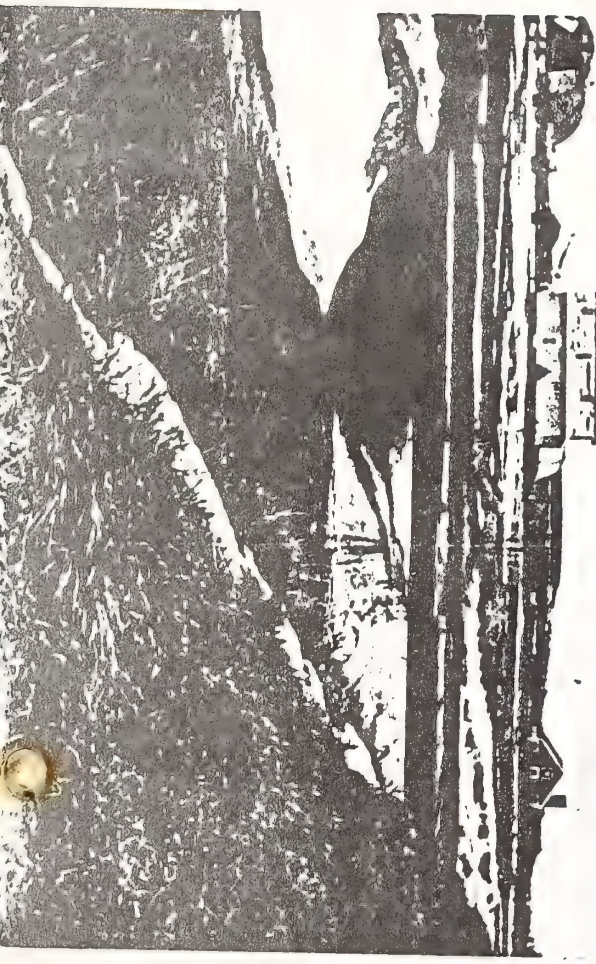
STRINGER "B"



STRINGER "C"

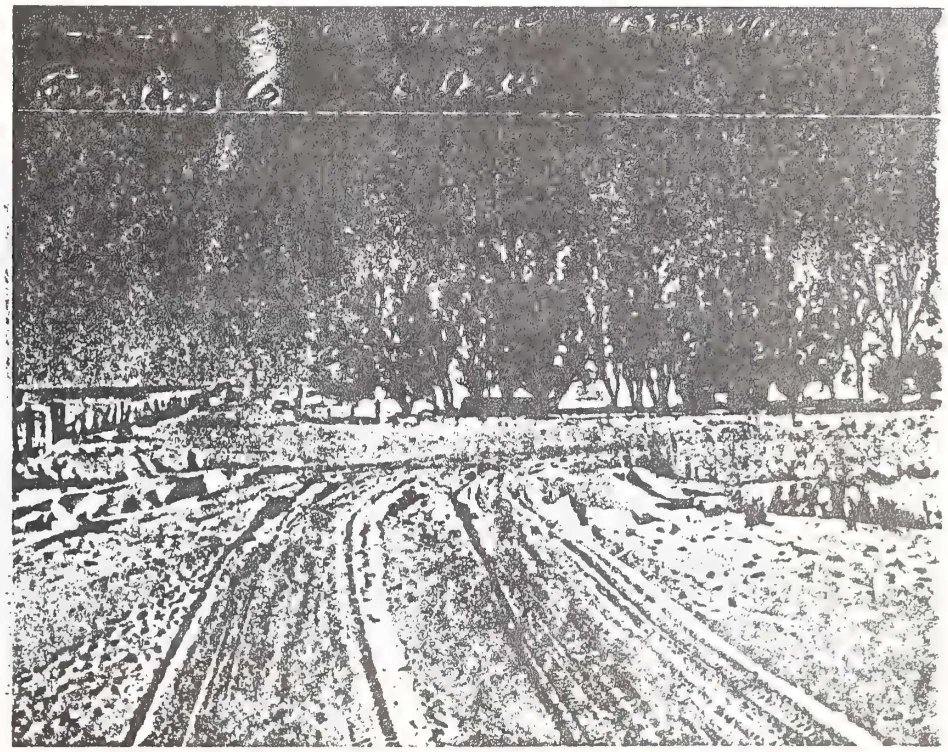
Comments: stringers are in fair Condition.

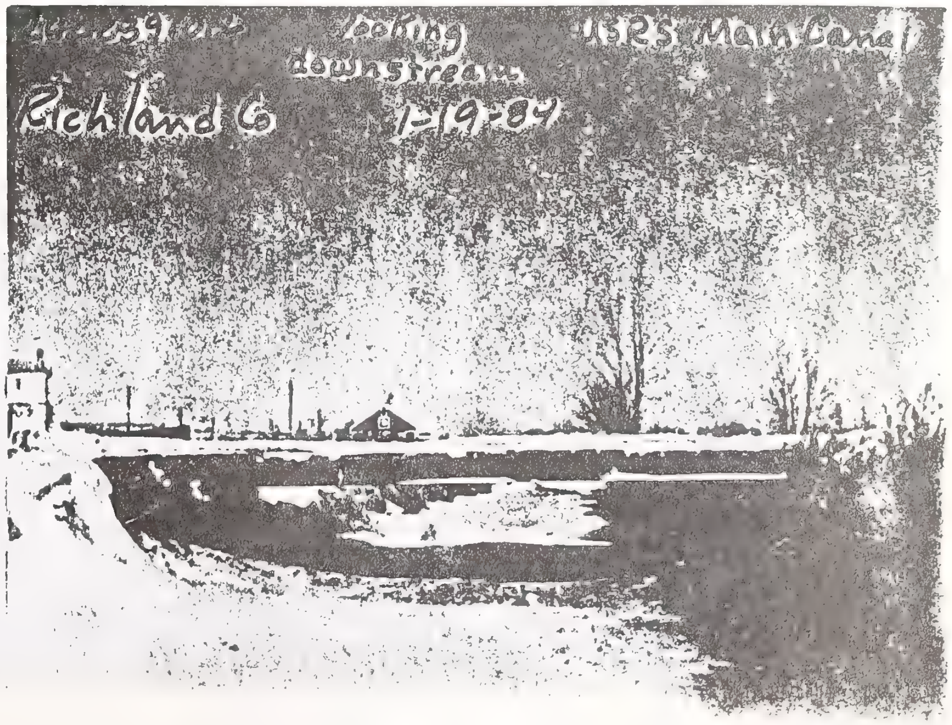


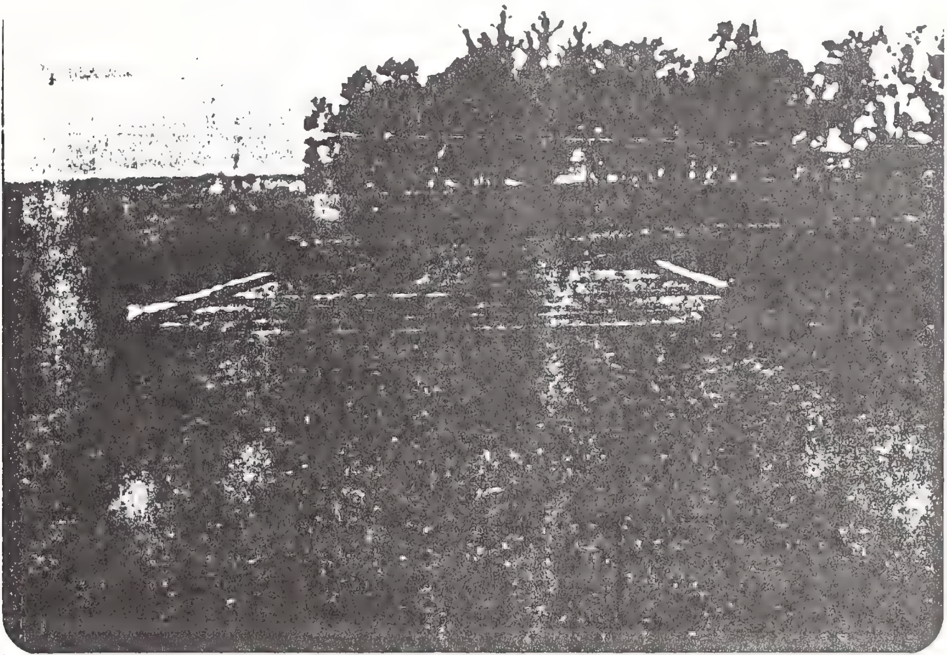


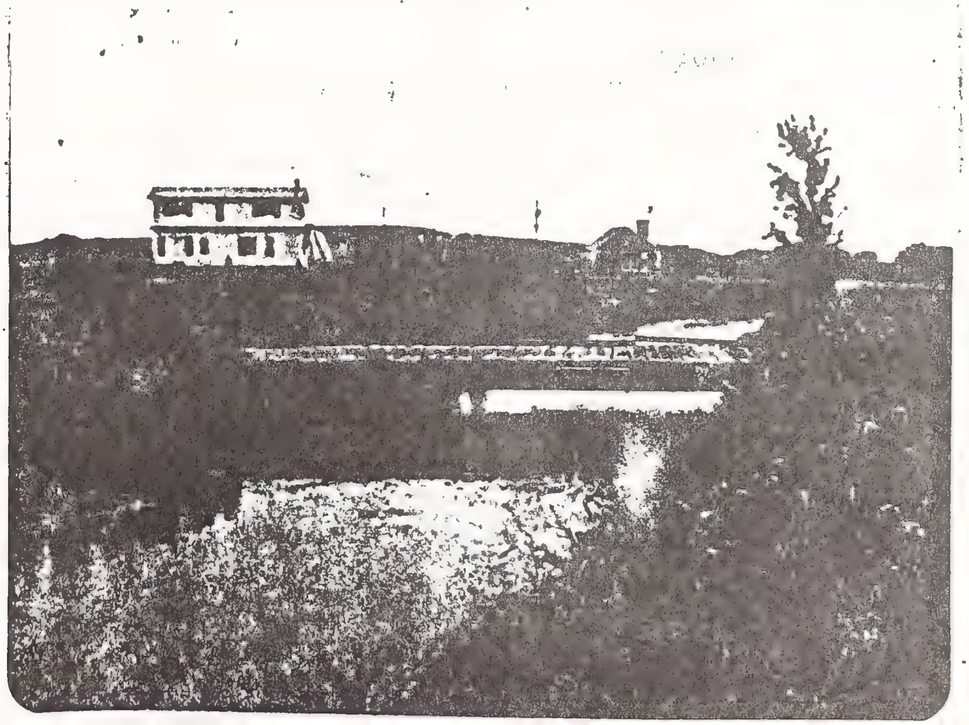
L42239-0.2 USRS CANAL
Looking Downstream 2-26-86

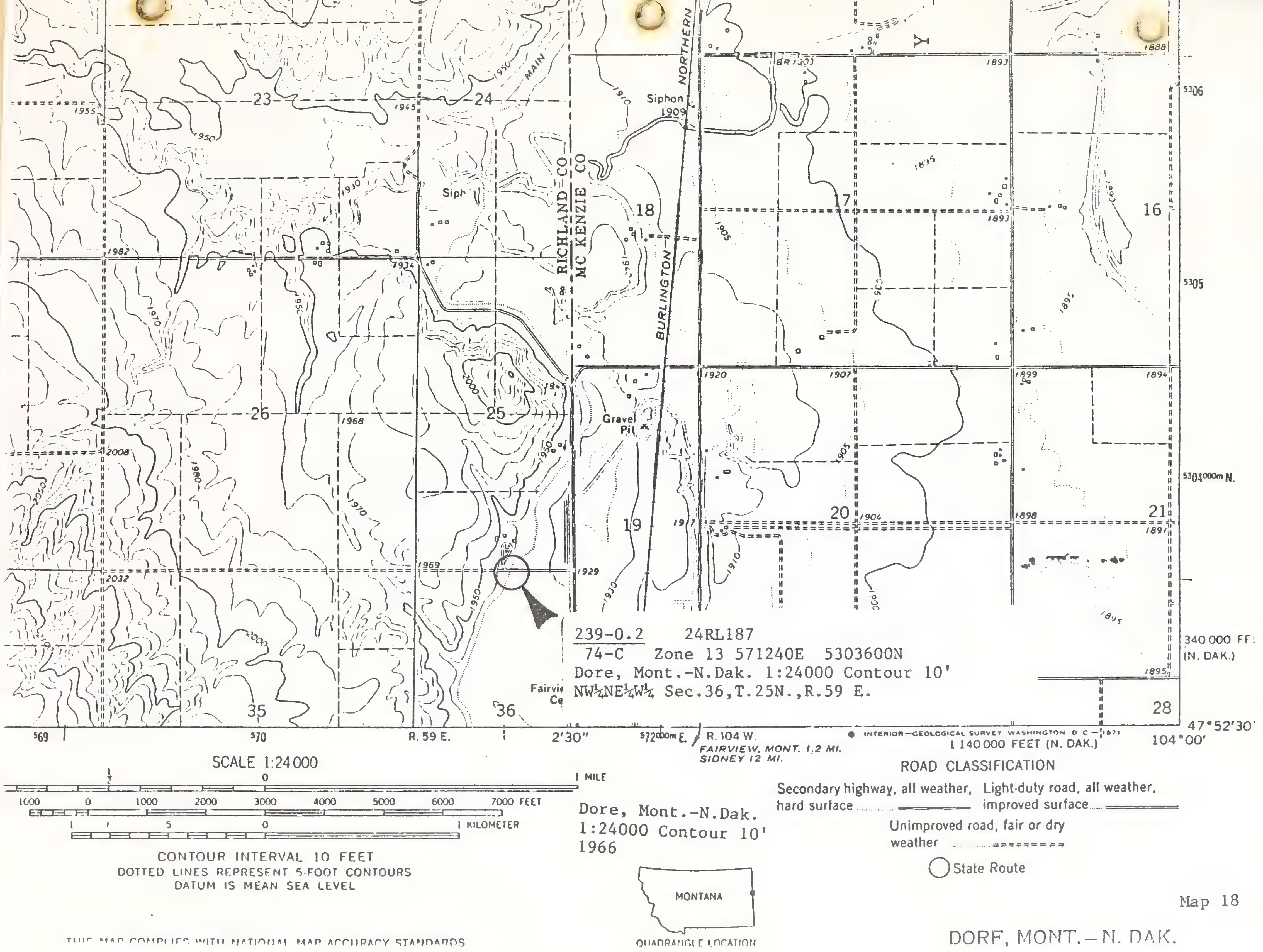
L42239-0.2 USRS CANAL
Looking west 2-26-86











239-0.2 / 74-C   24RL187
Zone 13 571240E 5303600N
Dore, Mont.-N.Dak. 1:24000 Contour 10'
NW¼NE¼W¼ Sec.36,T.25N.,R.59 E.

Dore, Mont.-N.Dak.
1:24000 Contour 10'
1966

Map 18

MONTANA BRIDGE INVENTORY FORM

Site Number: *32MZ908*
Site Name: *USRS Canal Bridge, Steel Stringer*
Structure Number: *101-18*
Year Built: *1908*
Evaluation
Determined Eligible ____
Ineligible ____
Date ____

LOCATION: *NW¼NW¼NW¼, Sec. 19 T. 151 N. R. 104 W.*
Note: *Sec. 19 is not a 640 acre section. Since it is smaller, it would have been lotted. A plat for determining lot numbers is not available.*
UTM Zone: *13, 571680 E. 5304440 N.*
Quad Name: *Dore, Mont. - N. Dak.*
Scale: *1:24000*
County/City: *McKenzie, ND* Route Mile Crossing *Main Canal*

OWNERSHIP: MDOH __ County/City _X_ Federal __ Private __ Tribal __
Specify McKenzie County

PRESENT USE: *Bridge over the Lower Yellowstone Project Main Canal.*

BASIC BRIDGE (check as appropriate)

_X_ Beam, Slab, Girder
__ Suspension
__ Arch
__ Movable
__ Truss
  __ Pin connected
  __ Rigid

MATERIALS

_X_ Wood
_X_ Metal
_X_ Combination
__ Stone
__ Reinforced Concrete
__ Prestressed Concrete

TYPE

_X_ Deck
__ Pony
__ Through
__ Combination

TRUSS DESIGN

__ King Post
__ Queen Post
__ Howe
__ Pratt
  __ Double Intersection
  __ Half Hip
  __ Parker
  __ Camelback
  __ Pennsylvania (Petit)
    __ Sub Struts
    __ Sub Ties
  __ Baltimore
__ Lenticular
__ Warren
  __ Verticles
  __ Polygonal Chord
  __ Double Intersecting
  __ Quadrangular
__ K
__ Other

Length *25'* Width *20'* No. spans *1* No. panels *1*
Abutments *Concrete & Wood* No. Piers *0* Type
Designer/Engineer *U.S. Reclamation Service, A. P. Davis, Chief Engineer*
Fabricator *Probably Lackawana*
Builder/Contractor *Probably Minneapolis Steel & Machinery Co., Minneapolis, Minnesota*

PHOTOGRAPHIC RECORD

Roll 11, Frames 10, 11, 12.

NARRATIVE DESCRIPTION

There are twelve 15" steel stringers with 17' I beam floor beams. The deck is wood plank, which is covered with dirt and gravel.

NARRATIVE HISTORY

Only 2 steel stringers were scheduled for construction on the Main Canal, and at least 4 others were planned for laterals. Of the Main Canal two, one was light, and one heavy. Since Bayne had the contract for light bridges, and Minneapolis Steel for heavy ones, it is assumed they built this heavy one. This station, 3197, had the last scheduled bridge on the canal. It was to be 22¼' long.

INTEGRITY *Poor. The wooden guardrails are missing, the deck has been replaced, and the steel is very rusted. The concrete abutment failed, and has been shored up with wooden piles and backboards.*

Altered *X* Unaltered Moved *No* Date
Summary of Move:

SIGNIFICANCE

This bridge is significant as one of the USRS Main Canal bridges on the Lower Yellowstone Project. It is the only representative of this type of steel stringer identified on the Main Canal. It's condition, however, is poor and it has lost visual integrity from the loss of its guardrail, as shown on specifications 136, drawing 2.

PROPOSED IMPACTS/RECOMMENDATIONS

None

Site Recorded By: *Dave Bacon*
Glendive District, MDOH
Date: *February 9, 1988*

Was Archaeological survey conducted around the structure?

Yes __ No X

Results negative __

Comments: *Canal and road construction and field leveling for irrigation would have completely altered the surface, precluding the possibility of finding intact archaeological resources.*

Was historical/architectural survey conducted around the structure?

Yes _X_ No __

Results negative _X_

Comments: *Structures date after 1966 when the USGS map was prepared. (See photos)*

EV:3:mb:248/a

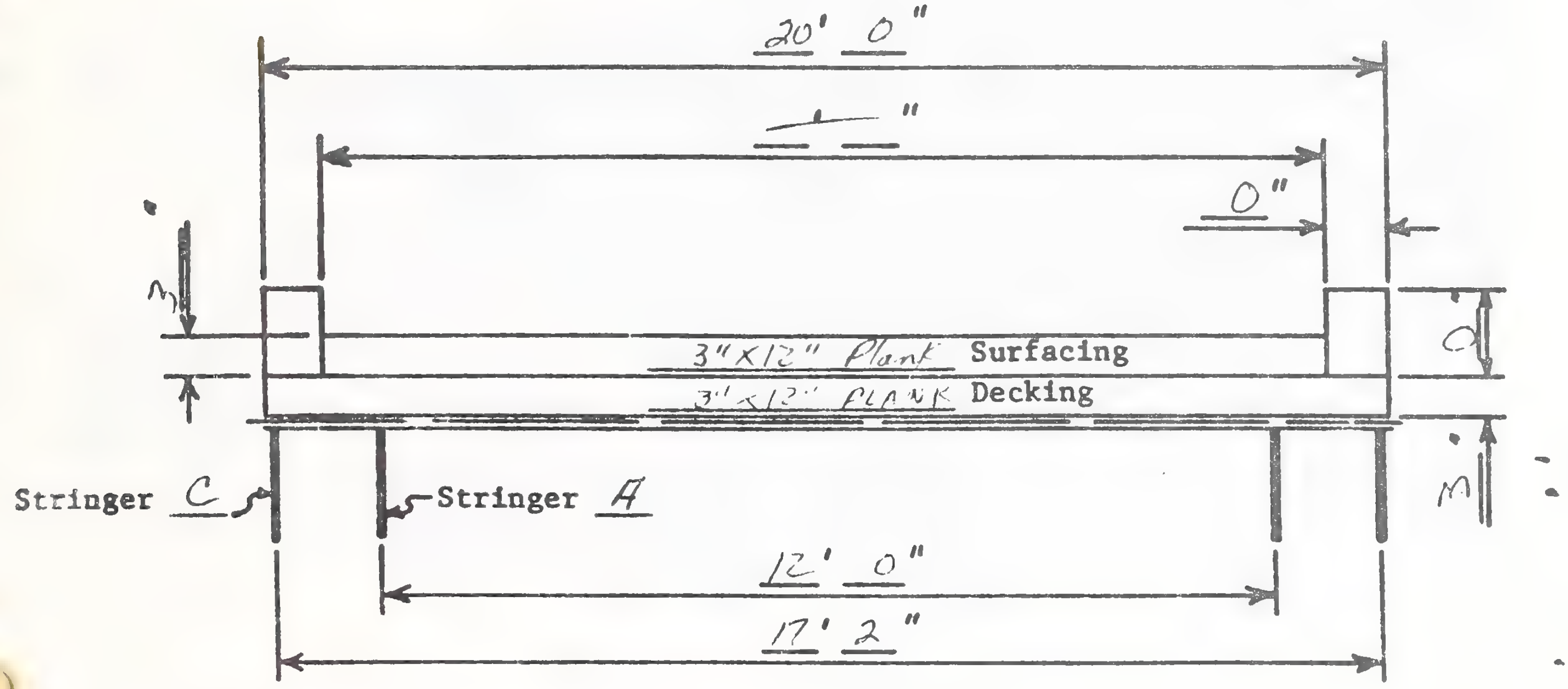
STRUCTURAL MEASUREMENTS FOR STEEL STRINGER BRIDGES

Sheet ____ of ____

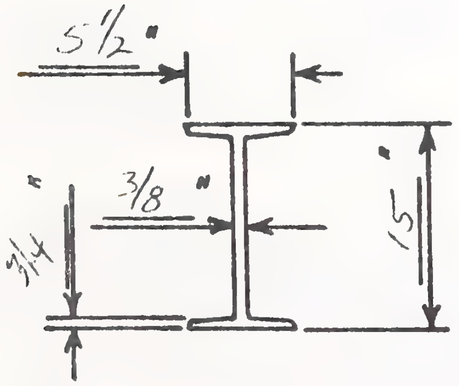
Structure Number L42 ? 000+0.100 Span(s) 1

Inspector DB

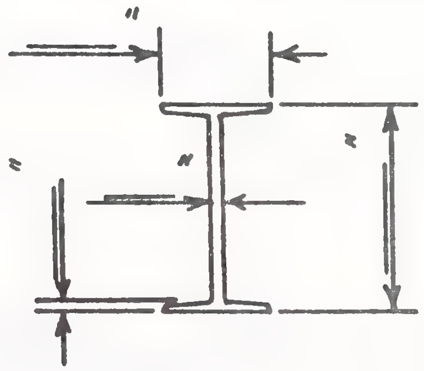
Date 1/8/88



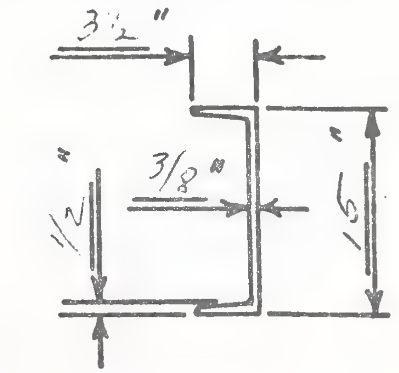
12 Stringers (total) Span Length 21' 2"



STRINGER "A"



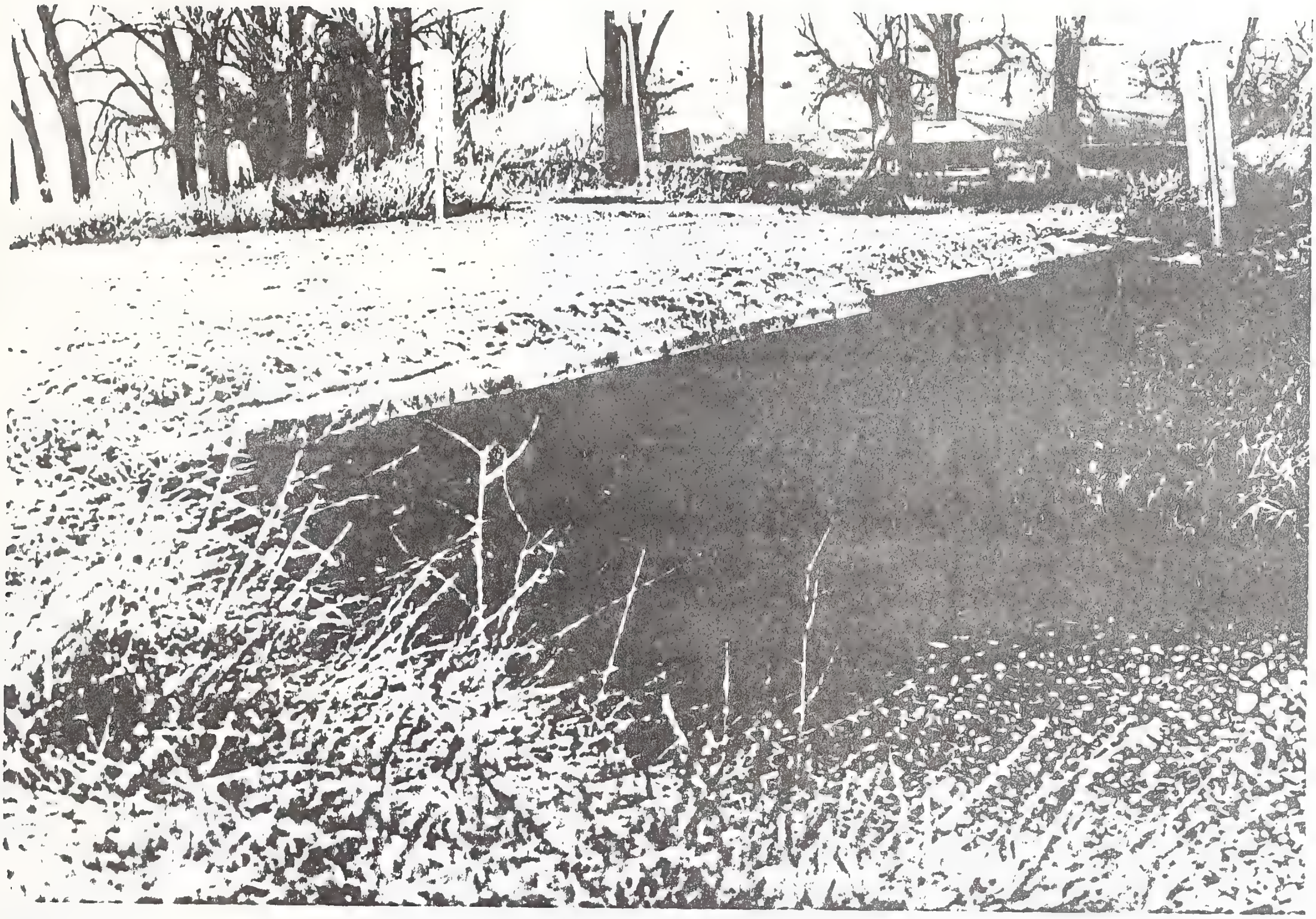
STRINGER "B"

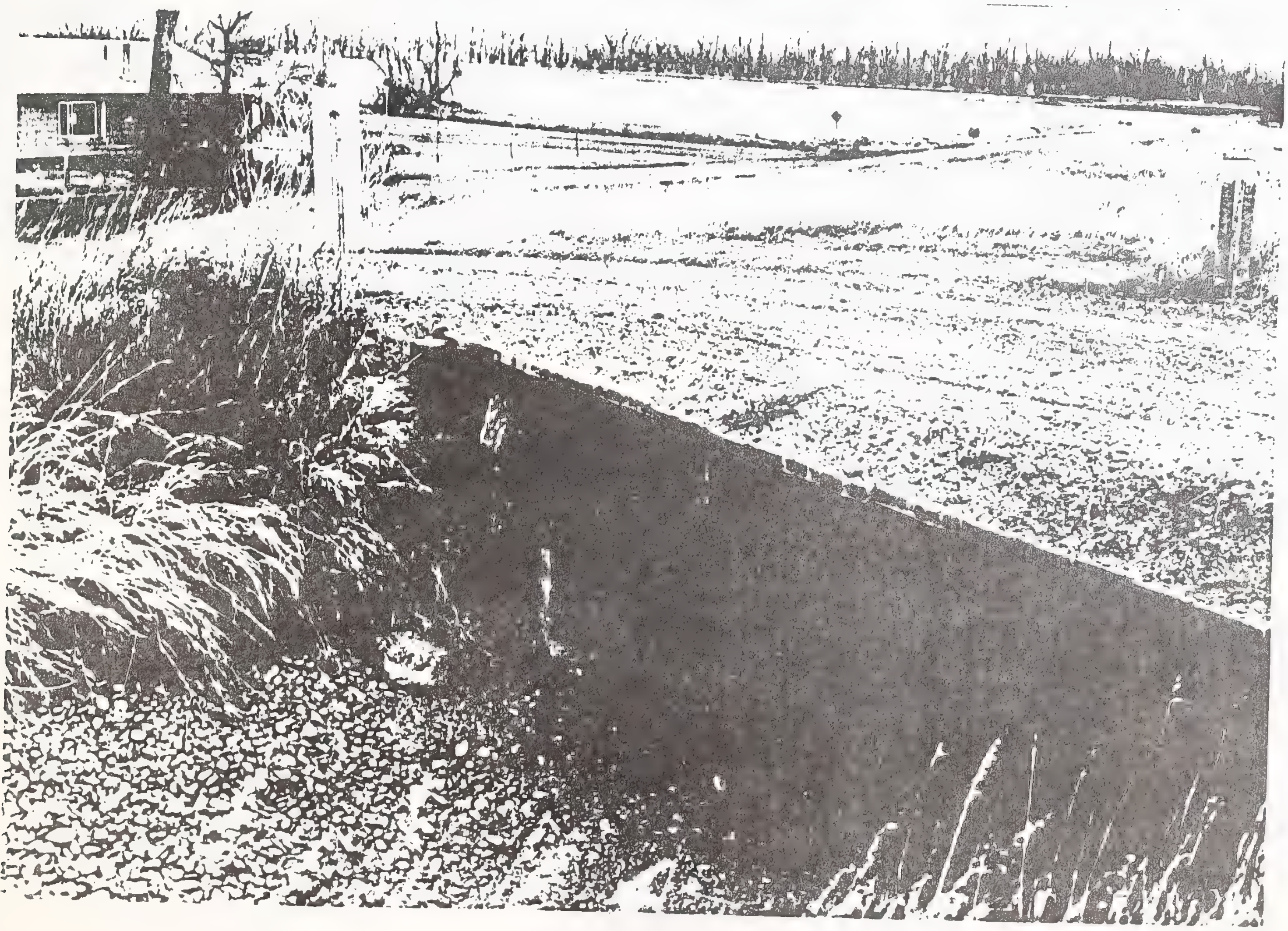


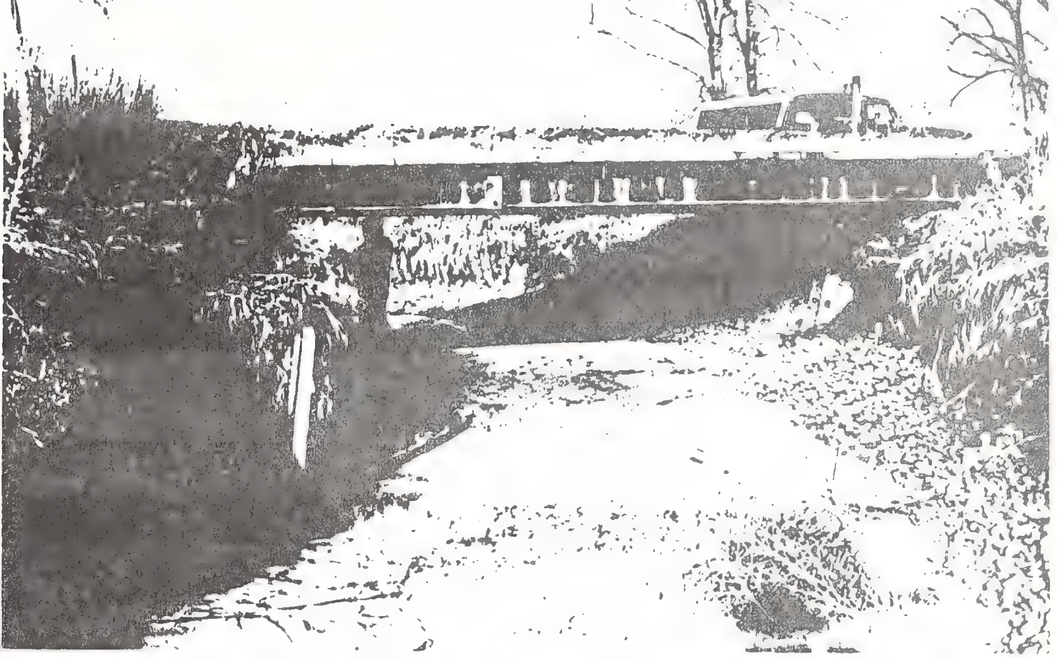
STRINGER "C"

Comments: Bracing is 2" diameter pipe spaced equally in each Bay

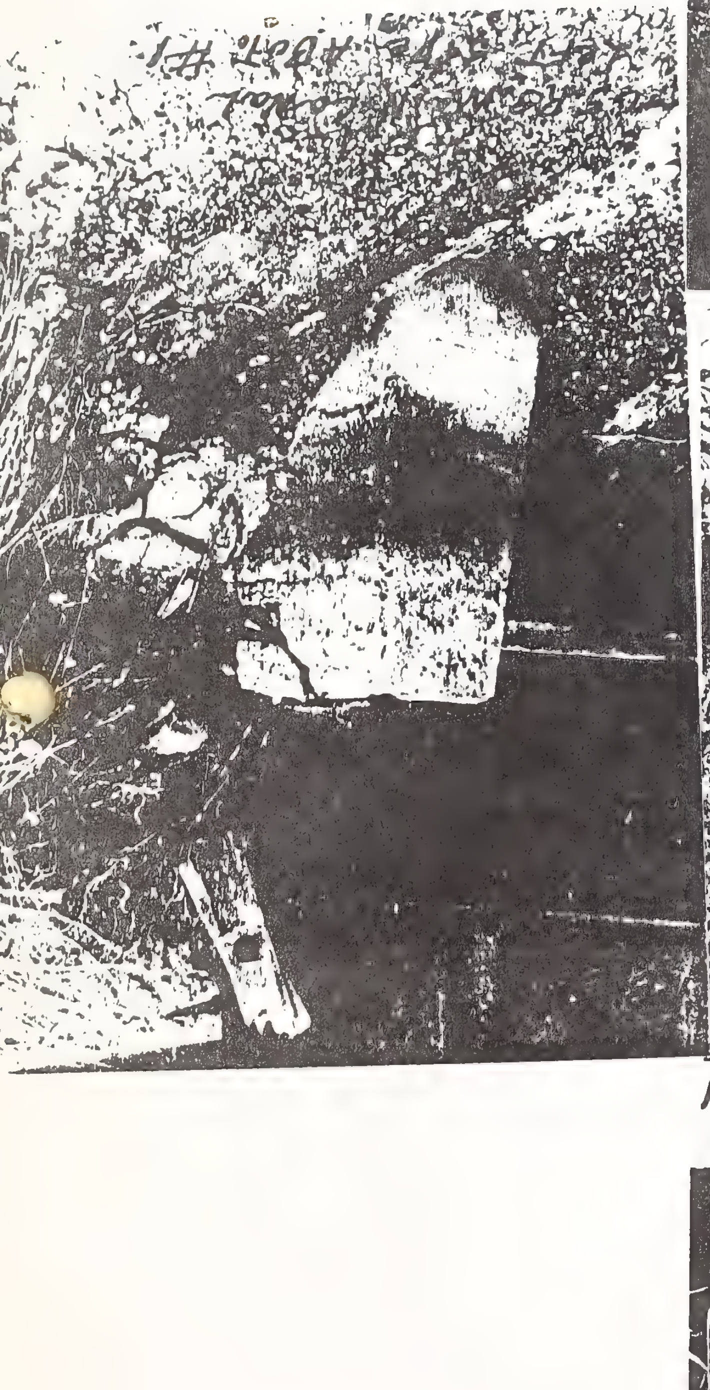
BW |←1'-3"→⊙←7'-0"→⊙←8'-6"→⊙←7'-6"→⊙←1-3"→| BW



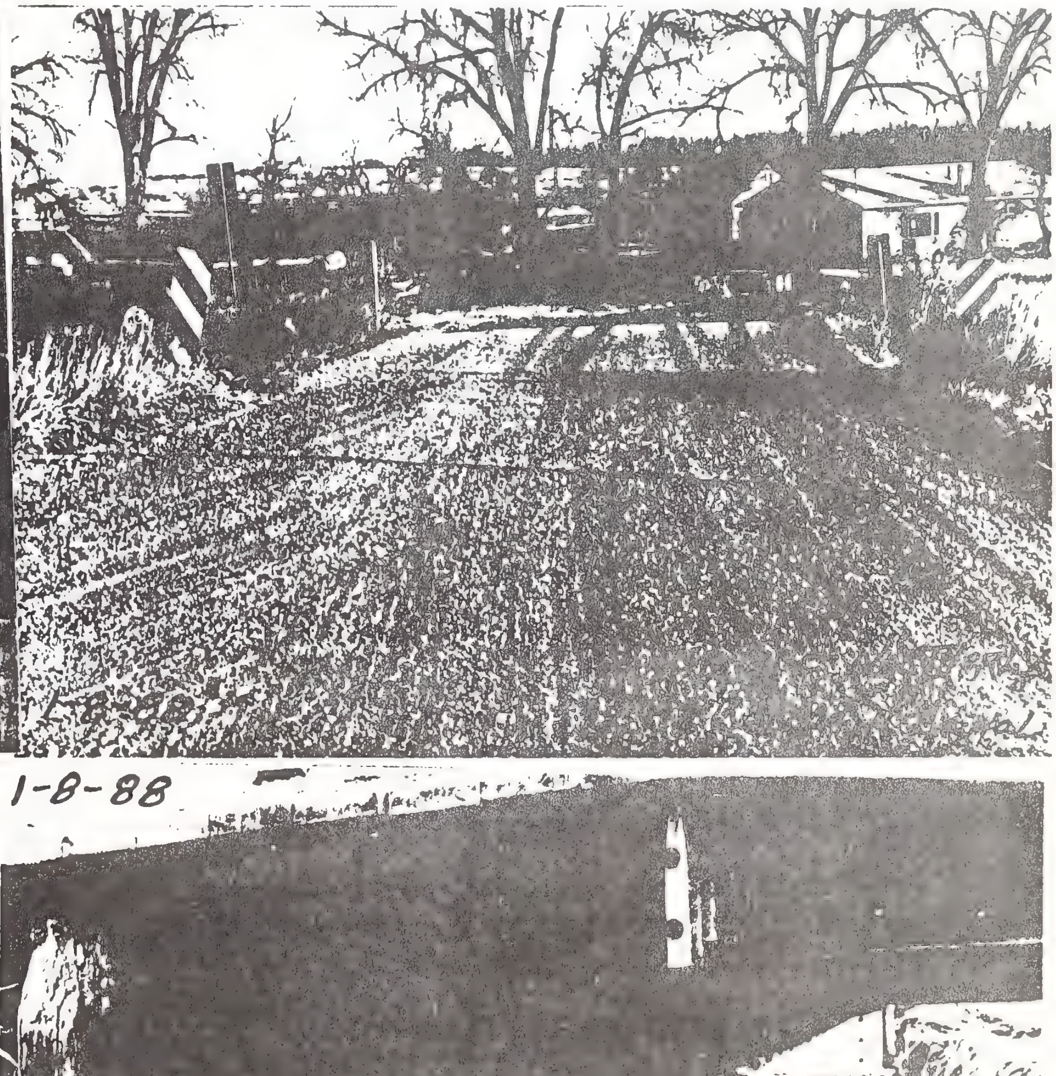




USR5 Main Canal



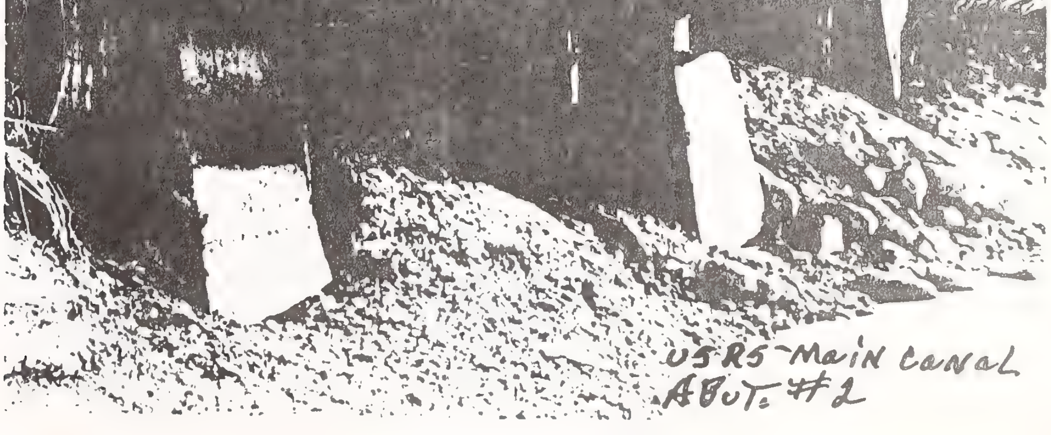
USR5 Main Canal
Abut. #1



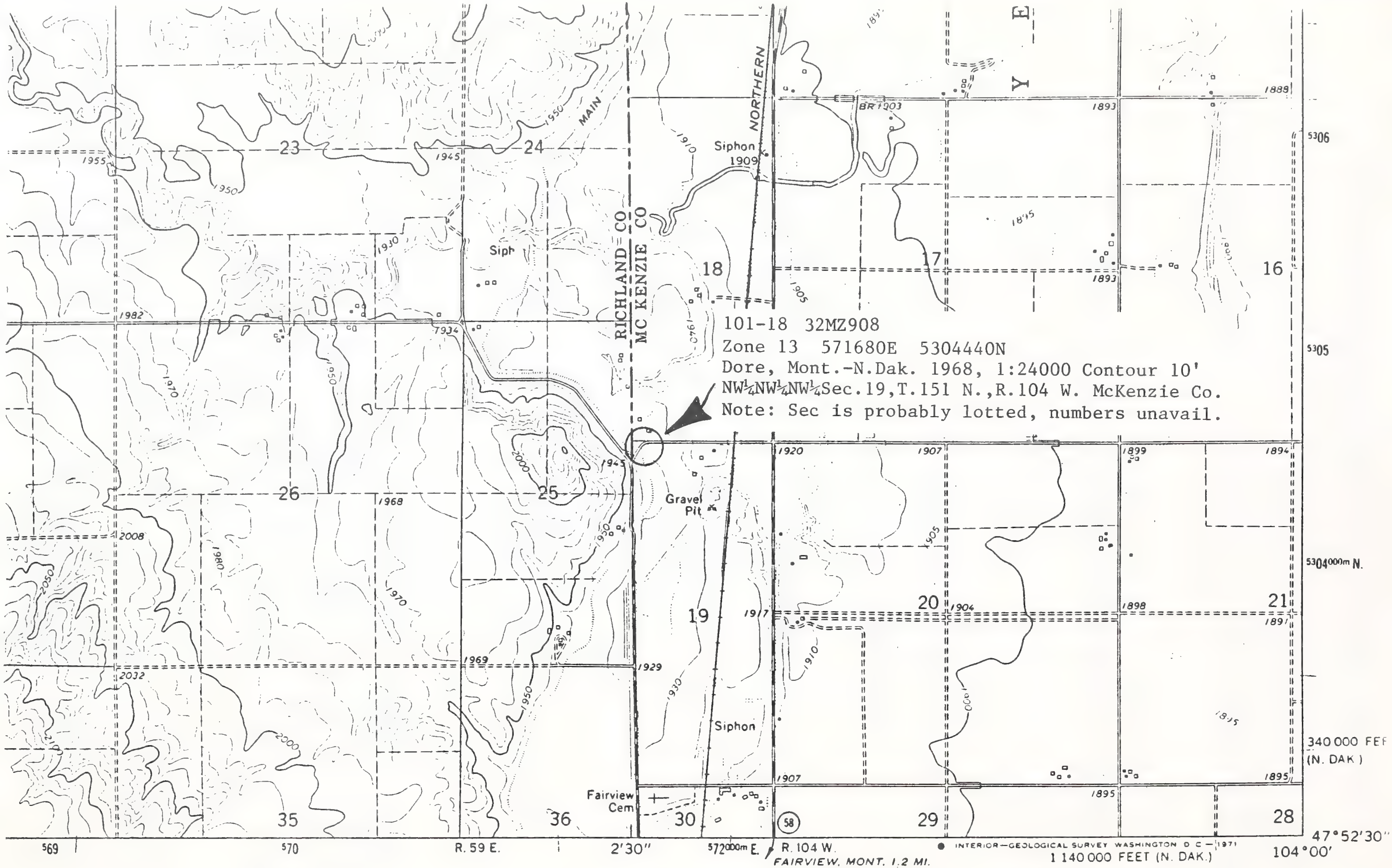
1-8-88

Canal

1-8-88

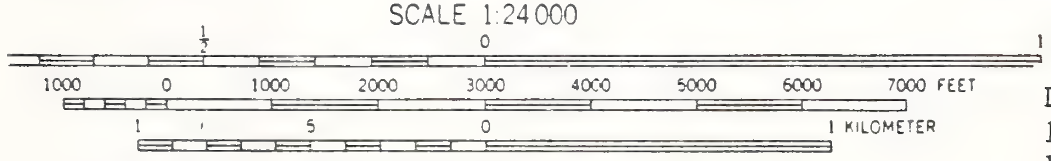


USR5-Main Canal
Abut. #2



101-18 32MZ908
Zone 13 571680E 5304440N
Dore, Mont.-N.Dak. 1968, 1:24000 Contour 10'
NW¼NW¼NW¼Sec.19,T.151 N.,R.104 W. McKenzie Co.
Note: Sec is probably lotted, numbers unavail.

SCALE 1:24 000



CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

Dore, Mont.-N.Dak.
1:24000 Contour 10'
1966

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Secondary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
○ State Route

Map 18

DORE, MONT.—N. DAK.

NDCRS SITE FORM
ARCHITECTURAL SITES

SITS # 32 MZ 908
State County Site Number

SITE I.D.

Field Code 101-18 Site Name USRS CANAL BRIDGE
Field Code Site Name

Map Quad DORE, MONT.-N.DAK.
Map Quad

LTL 0 Twp 151 N R 104 W Sec 19 QQQ 8 QQ 8 Q 6
LTL Twp R Sec QQQ QQ Q
LTL Twp R Sec QQQ QQ Q
LTL Twp R Sec QQQ QQ Q
LTL Twp R Sec QQQ QQ Q
LTL Twp R Sec QQQ QQ Q

1. N½
2. E½
3. S½
4. W½
5. NE¼
6. SE¼
7. SW¼
8. NW¼
9. C

SITE DATA

SITE DATA

City

Street # Street #

Street Name Street Name

# of Features 01

FEATURE DATA

FEATURE DATA

1 Feature #
1908 Const Date
Feature Date
21 Feature Type
2 Context
5 Condition
2 Significance
5 Plan Shape

PORCH
Original
Addition/Altered
Removed/None

BUILDING MATERIALS
14 Structure System
Primary Exterior Finish
Secondary Exterior Finish

Main Entrance

Ethnic
Style
020988 Fieldwork Date

1 Builder
1 Engineer
Designer Architect

LOWER YELLOWSTONE PROJECT Other Information

SHSND USE

Soil Association Ecozone Area Signf MS Number
Soil Association Ecozone Area Signf MS Number
CR Type Verified Site Non-Site E C F T F
State Registry National Register

Coder

Date Coded

NDCRS ARCHITECTURAL SITE FORM
Page 2

Field Code 101-18

SITS NUMBER 32 MZ908

FEATURE # 1

NAME IN NAME BLOCK USRS Canal Bridge

BASEMENT

- ☐ yes
- ☐ no
- ☐ unknown
- ☐ other

WINDOWS

- ☐ Original
- ☐ Altered

FOUNDATION MATERIALS

- ☐ Brick
- ☐ Concrete Block
- ☐ Fieldstone
- ☐ Cut Stone
- ☒ Poured Concrete
- ☐ Refaced
- ☐ Unknown
- ☐ Other

STORIES

- ☐ 1
- ☐ 1 1/2
- ☐ 2
- ☐ 2 1/2
- ☐ 3
- ☐ Other

CORNICE

- ☐ Metal
- ☐ Brick
- ☐ None
- ☐ Wood
- ☐ Other

ROOF TYPE

- ☐ Gable
- ☐ Hipped
- ☐ Deck
- ☐ Gambrel
- ☐ Flat
- ☐ Other

DATING METHOD

- ☐ Plat Map(s)
- ☐ County Atlas
- ☐ Date Block
- ☐ Sanborn Map(s)
- ☐ Topo Map(s)
- ☒ Other

US Reclamation Service Records

FEATURE DESCRIPTION & STATEMENT OF INTEGRITY This bridge is composed of 12 steel stringers 15" high, held by 17' I Beam floor beams. The deck is of wood plank, and is covered with dirt and gravel. The original concrete abutments have failed, and are temporarily shored up with wooden piles and backboards. The original timber guardrails are missing. The bridge is one of 28 Lower Yellowstone Project Main Canal bridges identified in a 1988 survey. It is one of 2 steel stringers (the others are pony and through trusses). This i[illegible]he only one of the group located in North Dakota. It is single span, 25'long, 20' wide, single panel. It was designed by the USRS, A.P. Davis, Chief Engineer, and probably built by Minneapolis Steel and Machinery Company, using Lackawanna Steel.

SIGNIFICANCE

☐ SIGNIFICANT

- ☐ Work of Master
- ☐ High Artistic Values
- ☐ Rep. of type, period, method of construction
- ☐ Other
- ☐ Visual Landmark
- ☐ Associated with significant event
- ☐ Associated with devel. of locality
- ☐ Associated with significant person

☒ NOT SIGNIFICANT

- ☐ Too new
- ☒ Lacking integrity
- ☐ Not High Style
- ☐ Other

JUSTIFICATION OF SIGNIFICANCE It is not recognizable by original design. See the Lower Yellowstone Project report for historic context, site descriptions, evaluations and statements of significance.

Recorded by Dave Bacon, Glendive District, Montana Dept. of Highways

Date 2-9-88

NDCRS ARCHITECTURAL SITE FORM

Field Code 101-18

SITS NUMBER 32 MZ908

ACC Proceed N from Highway 200 along an unpaved road along the Montana - North Dakota border for 2 miles. A fork to the east crosses the USRS Main Canal over this bridge.

DESCRIPTION OF SITE The bridge is a single span steel stringer measuring 25' long and 20' wide. The 12 stringers are 15" high, the I beam floor beams are 17' wide. The bridge crosses the USRS Main Canal on the Lower Yellowstone Irrigation Project, a Newlands or Reclamation Act project built 1905-1909 in Montana and North Dakota.

FEATURES The site includes only one bridge.

SITE AREA 56 (in meters)

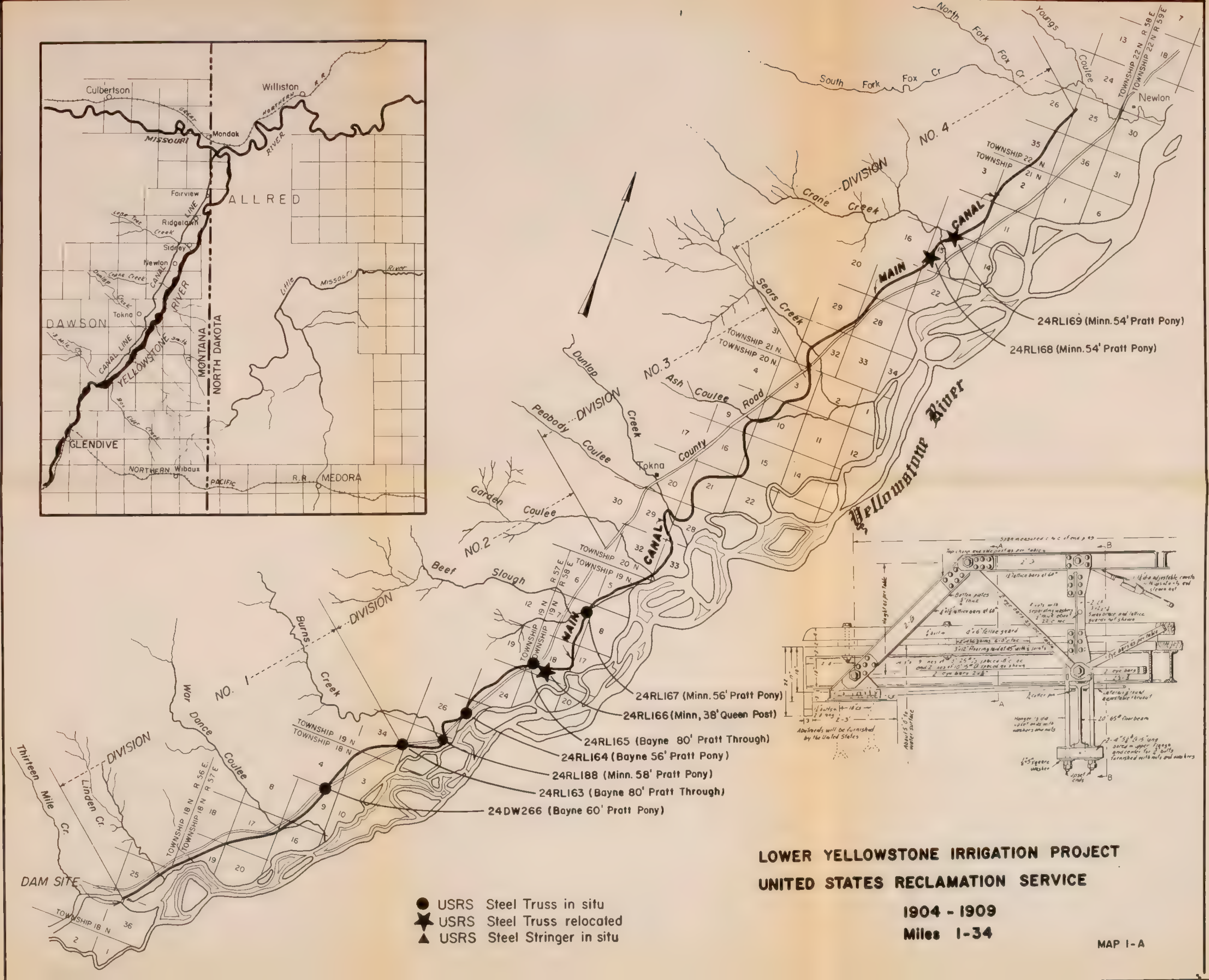
OWNER'S NAME, ADDRESS, PHONE # Probably McKenzie County Road Department.

PROJECT TITLE BR 9042 Usrs Main Canal 4 miles North of Sidney, Montana

REPORT TITLE Lower Yellowstone Project Main Canal Bridges

PROJECT SUPERVISOR Montana Dept. of Highways REPORT AUTHOR Edrie Vinson

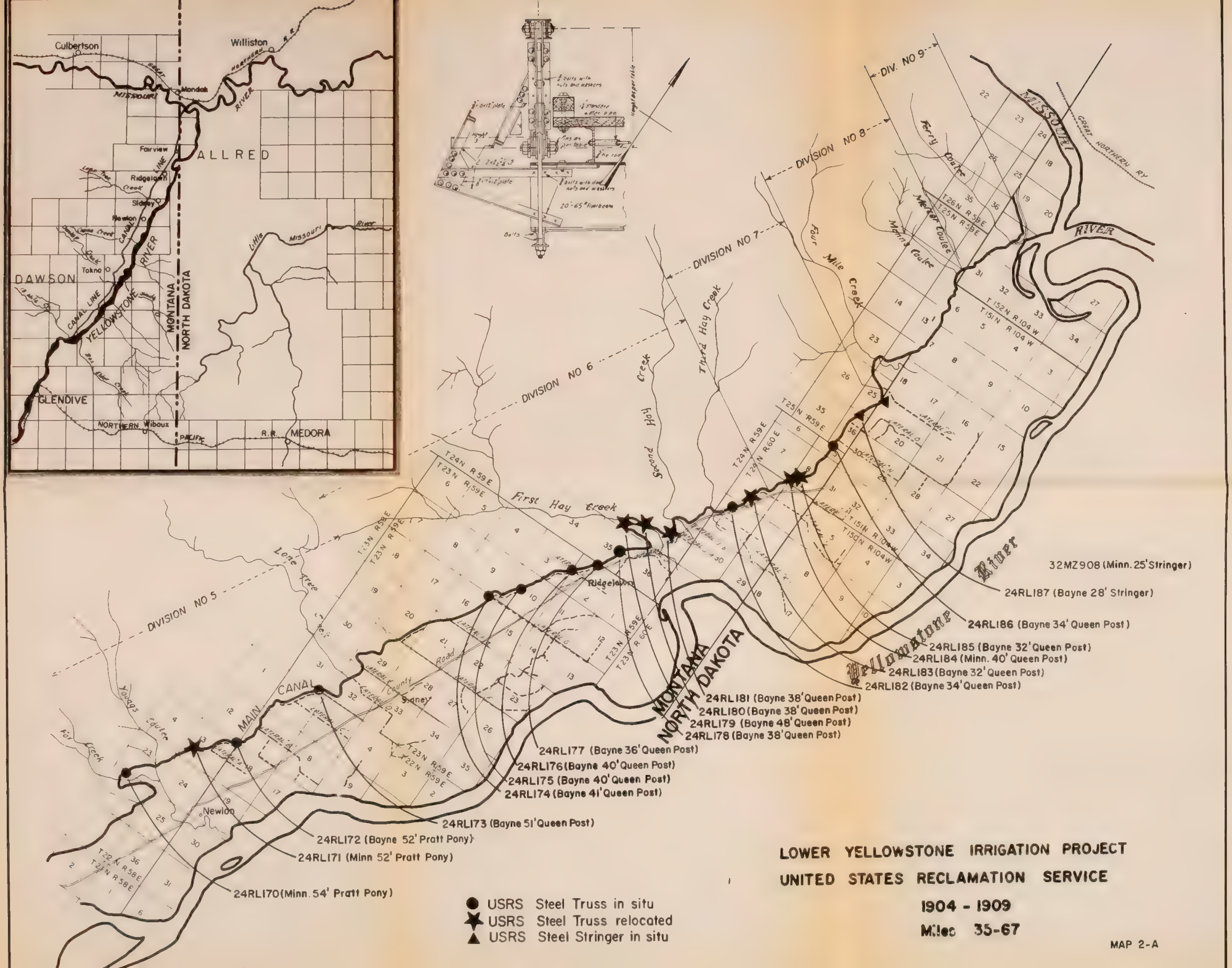
STATEMENT OF SIGNIFICANCE AND INTEGRITY The bridge is recommended as not significant due to loss of integrity. The loss of its wooden guardrail renders it unrecognizable as a USRS bridge.



● USRS Steel Truss in situ
★ USRS Steel Truss relocated
▲ USRS Steel Stringer in situ

LOWER YELLOWSTONE IRRIGATION PROJECT
UNITED STATES RECLAMATION SERVICE
1904 - 1909
Miles 1-34

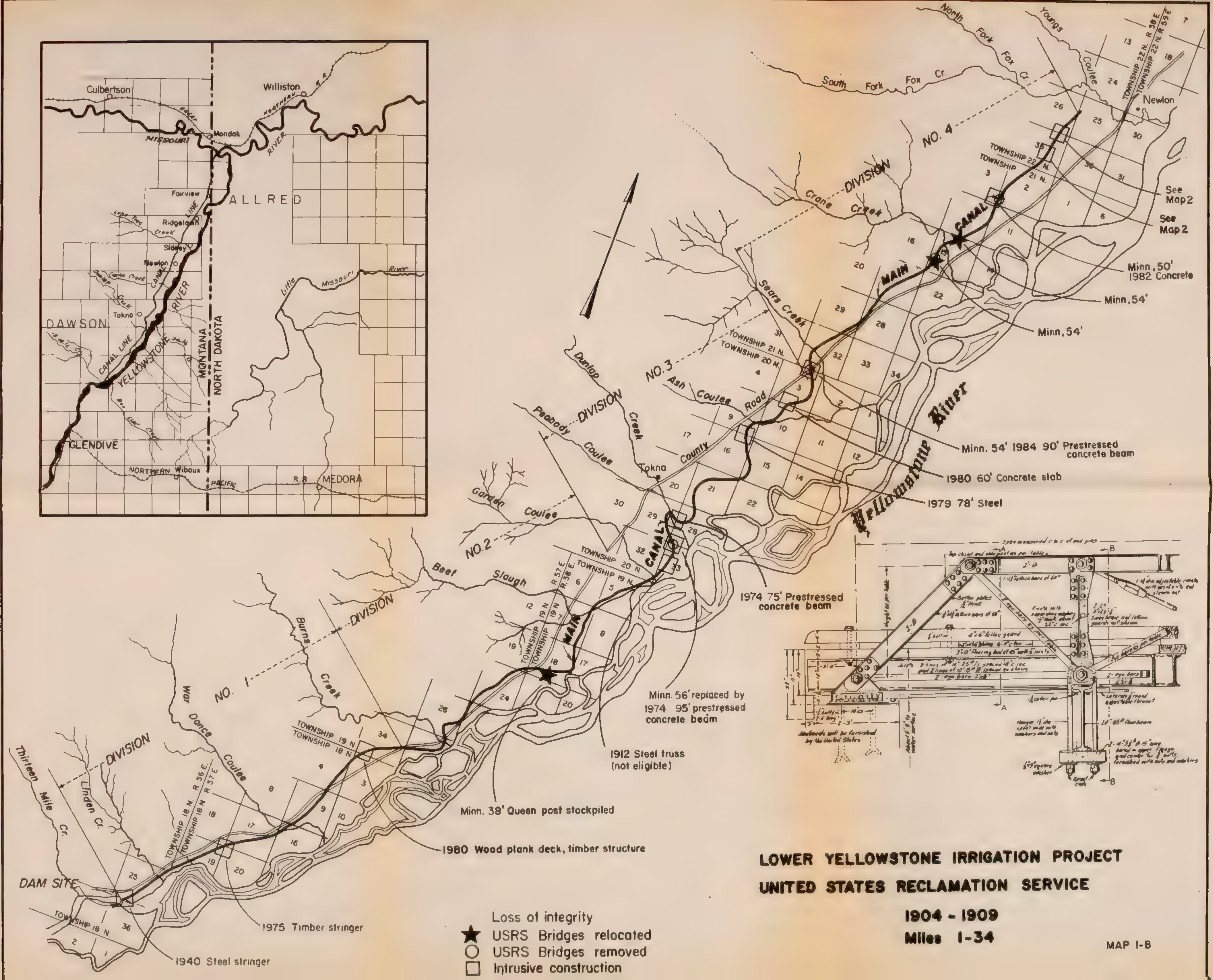
MAP 1-A



● USRS Steel Truss in situ
★ USRS Steel Truss relocated
▲ USRS Steel Stringer in situ

LOWER YELLOWSTONE IRRIGATION PROJECT
UNITED STATES RECLAMATION SERVICE
1904 - 1909
Miles 35-67

MAP 2-A



Minn, 50' 1982 Concrete

Minn, 54'

Minn, 54'

Minn. 54' 1984 90' Prestressed concrete beam

1980 60' Concrete slab

1979 78' Steel

1974 75' Prestressed concrete beam

Minn. 56' replaced by 1974 95' prestressed concrete beam

1912 Steel truss (not eligible)

Minn. 38' Queen post stockpiled

1980 Wood plank deck, timber structure

1975 Timber stringer

1940 Steel stringer

Loss of integrity
- ★ USRS Bridges relocated
- ○ USRS Bridges removed
- □ Intrusive construction

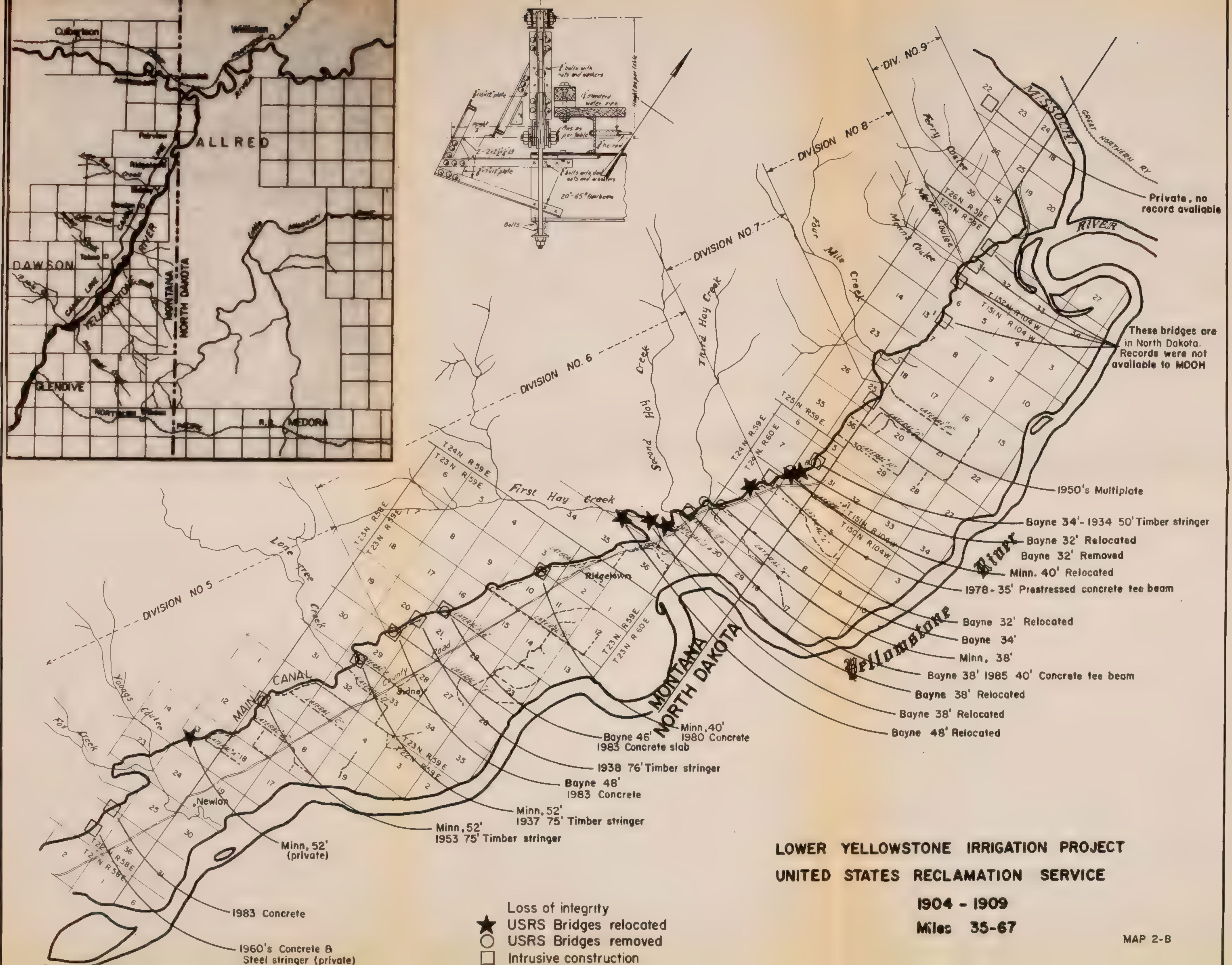
LOWER YELLOWSTONE IRRIGATION PROJECT

UNITED STATES RECLAMATION SERVICE

1904 - 1909

Miles 1-34

MAP I-B



Private, no record available

These bridges are in North Dakota. Records were not available to MDOH

1950's Multiplate

Bayne 34'- 1934 50' Timber stringer

Bayne 32' Relocated

Bayne 32' Removed

Minn. 40' Relocated

1978 - 35' Prestressed concrete tee beam

Bayne 32' Relocated

Bayne 34'

Minn. 38'

Bayne 38' 1985 40' Concrete tee beam

Bayne 38' Relocated

Bayne 38' Relocated

Bayne 48' Relocated

Bayne 46'
1983 Concrete slab

Minn, 40'
1980 Concrete

1938 76' Timber stringer

Bayne 48'
1983 Concrete

Minn, 52'
1937 75' Timber stringer

Minn, 52'
1953 75' Timber stringer

Minn, 52'
(private)

1983 Concrete

1960's Concrete & Steel stringer (private)

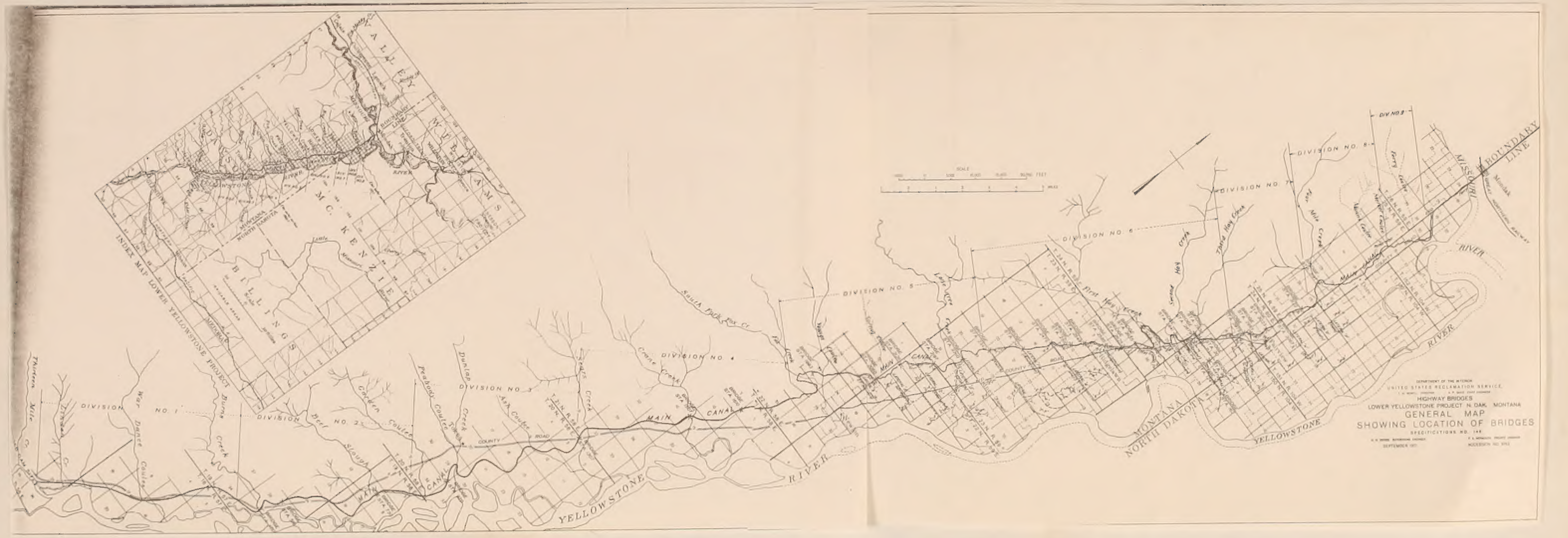
Loss of integrity
★ USRS Bridges relocated
○ USRS Bridges removed
☐ Intrusive construction

LOWER YELLOWSTONE IRRIGATION PROJECT
UNITED STATES RECLAMATION SERVICE

1904 - 1909

Miles 35-67

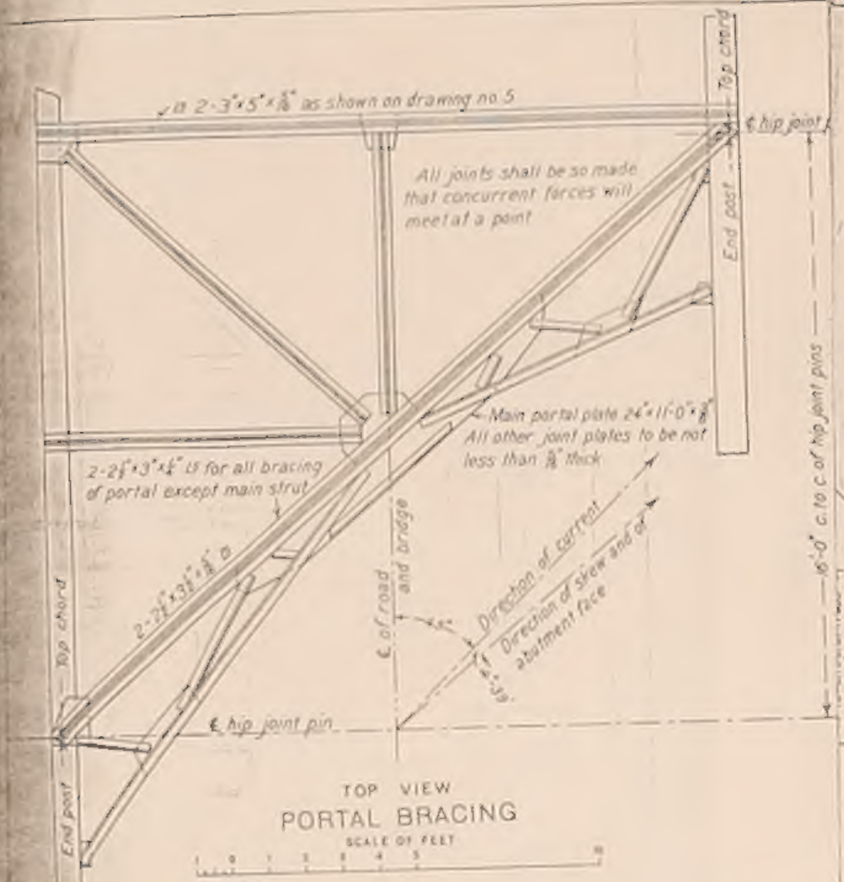
MAP 2-B



DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
[illegible]
HIGHWAY BRIDGES
LOWER YELLOWSTONE PROJECT N. DAK. MONTANA

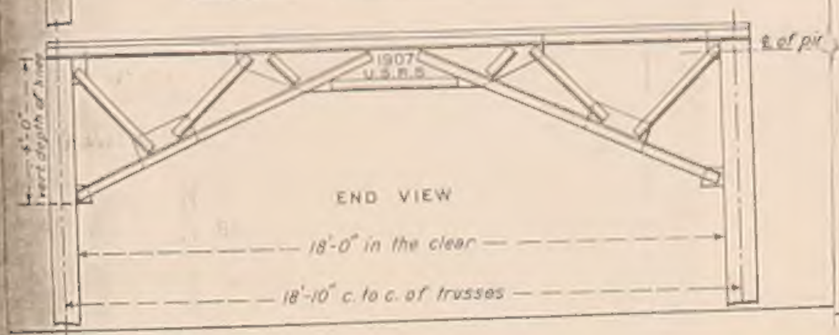
GENERAL MAP
SHOWING LOCATION OF BRIDGES

SPECIFICATIONS NO. [illegible]
[illegible]
SEPTEMBER [illegible]
[illegible]
ACCESSION NO. [illegible]

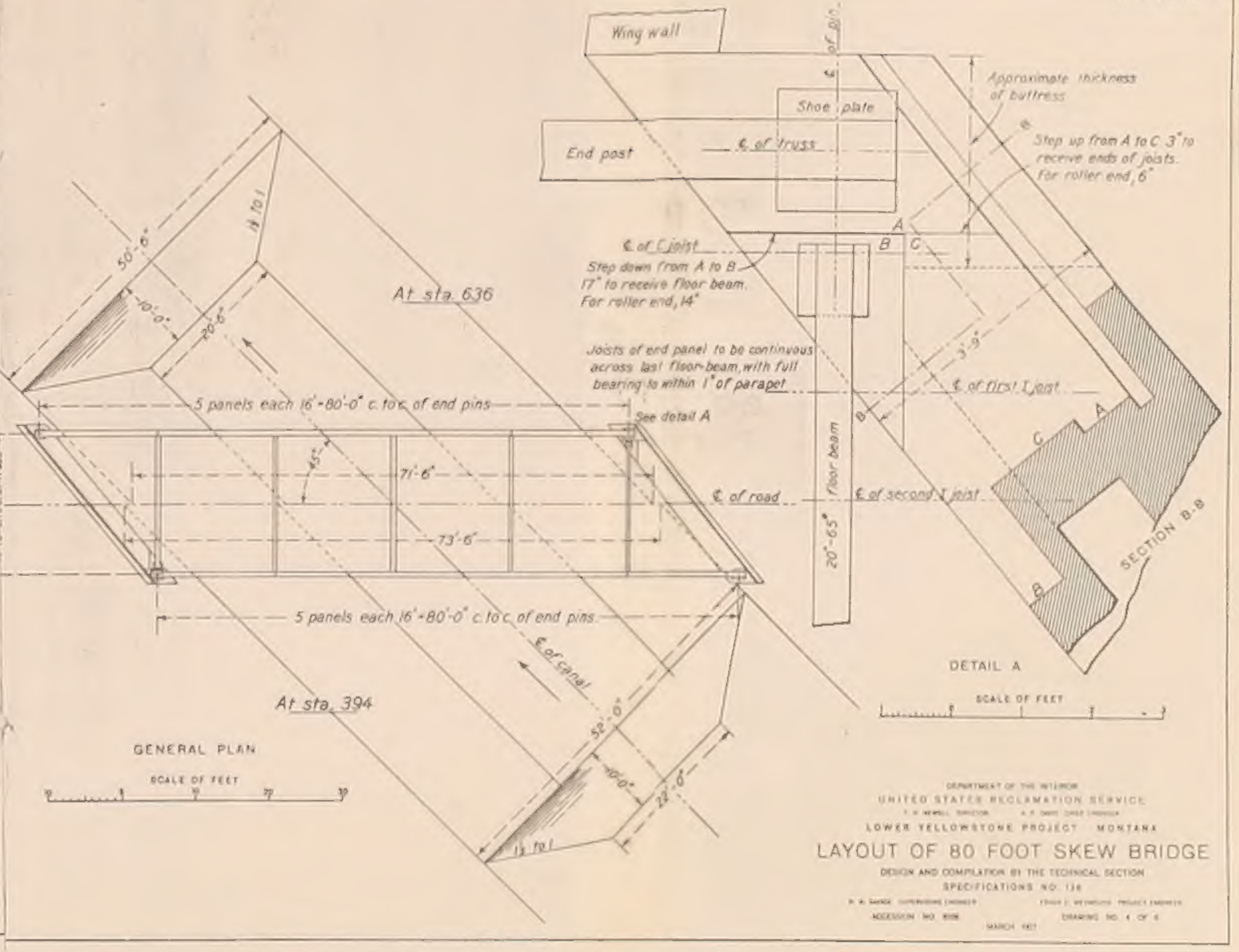

⅃B 2-3"×5"×5/16" as shown on drawing no. 5
All joints shall be so made that concurrent forces will meet at a point
Main portal plate 24"×11'-0"×3/8"
All other joint plates to be not less than 3/8" thick
2-2½"×3"×¼" ⅃s for all bracing of portal except main strut
2-2½"×3½"×3/8" ⅃s
℄ hip joint
Top chord
End post
℄ of road and bridge
Direction of current
Direction of skew and of abutment face
45°
16'-0" c. to c. of hip joint pins
℄ hip joint pin
SCALE OF FEET

TOP VIEW

PORTAL BRACING



END VIEW


Wing wall
End post
Shoe plate
℄ of truss
℄ of pin
Approximate thickness of buttress
Step up from A to C 3" to receive ends of joists. For roller end, 6"
℄ of I joist
Step down from A to B 17" to receive floor beam. For roller end, 14"
Joists of end panel to be continuous across last floor-beam, with full bearing to within 1" of parapet
℄ of first I joist
℄ of second I joist
℄ of road
Floor beam
20"-65#
3'-9"
A
B
C
SECTION B-B
At sta. 636
At sta. 394
50'-0"
10'-0"
20'-0"
1½ to 1
5 panels each 16'=80'-0" c. to c. of end pins
See detail A
45°
71'-6"
73'-6"
℄ of canal
52'-0"
22'-0"
SCALE OF FEET

GENERAL PLAN

DETAIL A

DEPARTMENT OF THE INTERIOR

UNITED STATES RECLAMATION SERVICE

F. H. NEWELL, DIRECTOR   A. P. DAVIS, CHIEF ENGINEER

LOWER YELLOWSTONE PROJECT   MONTANA

LAYOUT OF 80 FOOT SKEW BRIDGE

DESIGN AND COMPILATION BY THE TECHNICAL SECTION

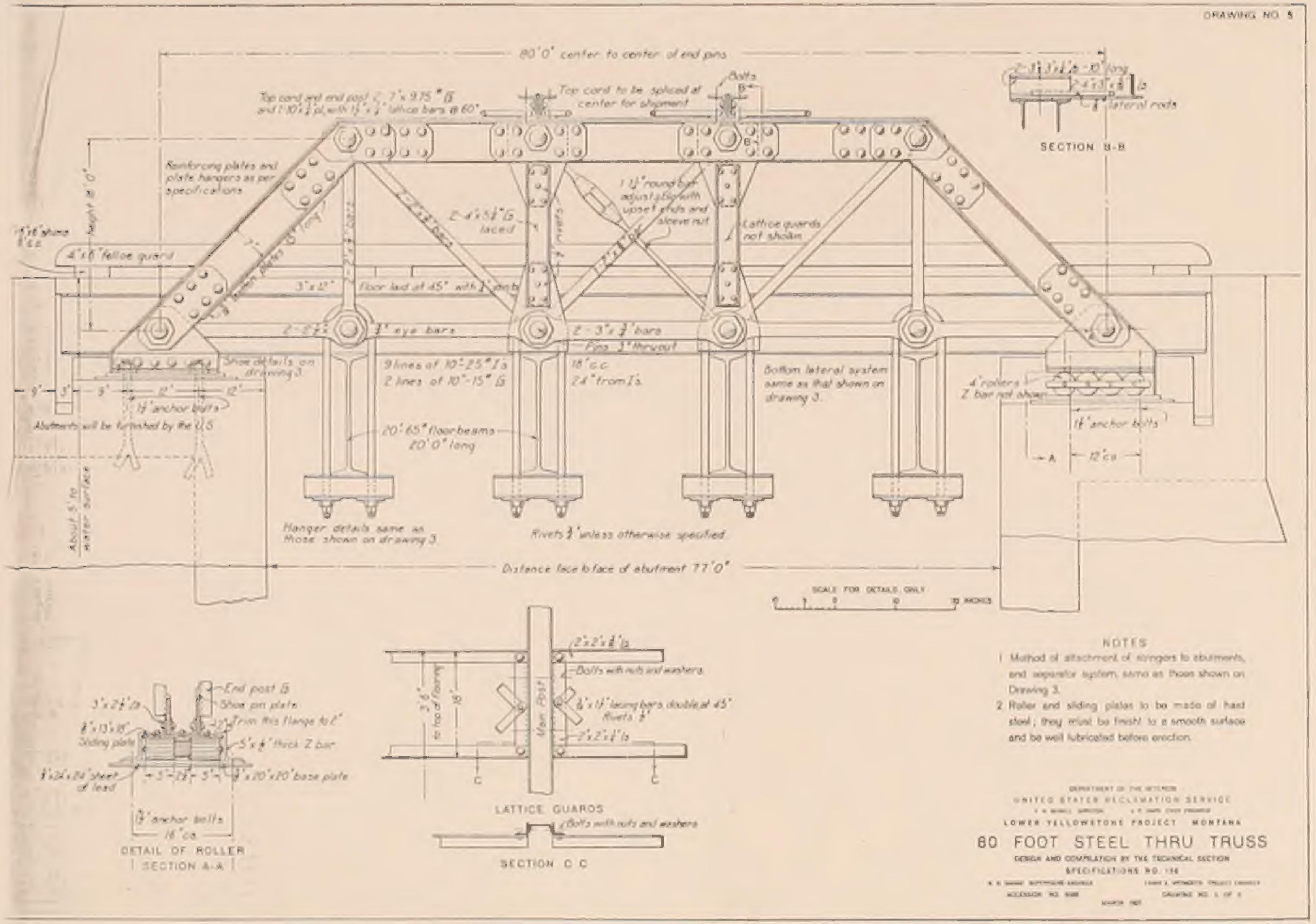
SPECIFICATIONS NO. 136

H. N. SAVAGE, SUPERVISING ENGINEER   FRANK E. WEYMOUTH, PROJECT ENGINEER

ACCESSION NO. [illegible]   DRAWING NO. 4 OF 5

MARCH 1907

DRAWING NO. 5


80'0" center to center of end pins
Top cord and end post 2 [7"×9.75# [s and 1-10×3/8 pl with 1½×¼ lattice bars @ 60°
Top cord to be spliced at center for shipment
Bolts
Reinforcing plates and plate hangers as per specifications
1¼" round bar adjustable with upset ends and sleeve nut
2-4"×5¼" [s laced
Lattice guards not shown
Height 18'0"
4"×6" fellow guard
3"×12" floor laid at 45° with ¼" joints
2-2"×¼" eye bars
2-3"×¾" bars
Pins 3" thruout
Shoe details on drawing 3
9 lines of 10"-25# I's
2 lines of 10"-15# [s
18" c.c.
24" from I's
Bottom lateral system same as that shown on drawing 3
4" rollers
Z bar not shown
1½" anchor bolts
Abutments will be furnished by the U.S.
20"-65# floor beams 20'0" long
Hanger details same as those shown on drawing 3
Rivets ¾" unless otherwise specified
About 5' to water surface
Distance face to face of abutment 77'0"
12" cs
SECTION B-B
lateral rods
SCALE FOR DETAILS ONLY
INCHES
End post [s
Shoe pin plate
Trim this flange to Z
5"×½" thick Z bar
3"×2½" [s
20"×20" base plate
Sliding plate
of lead
1½" anchor bolts
16" cs
DETAIL OF ROLLER
SECTION A-A
2½"×2"×¼" [s
Bolts with nuts and washers
Main Post
¼"×1½" lacing bars double at 45°
Rivets ¾"
to top of flooring
LATTICE GUARDS
SECTION C-C

NOTES

1 Method of attachment of stringers to abutments, and separator system, same as those shown on Drawing 3.

2 Roller and sliding plates to be made of hard steel; they must be finisht to a smooth surface and be well lubricated before erection.

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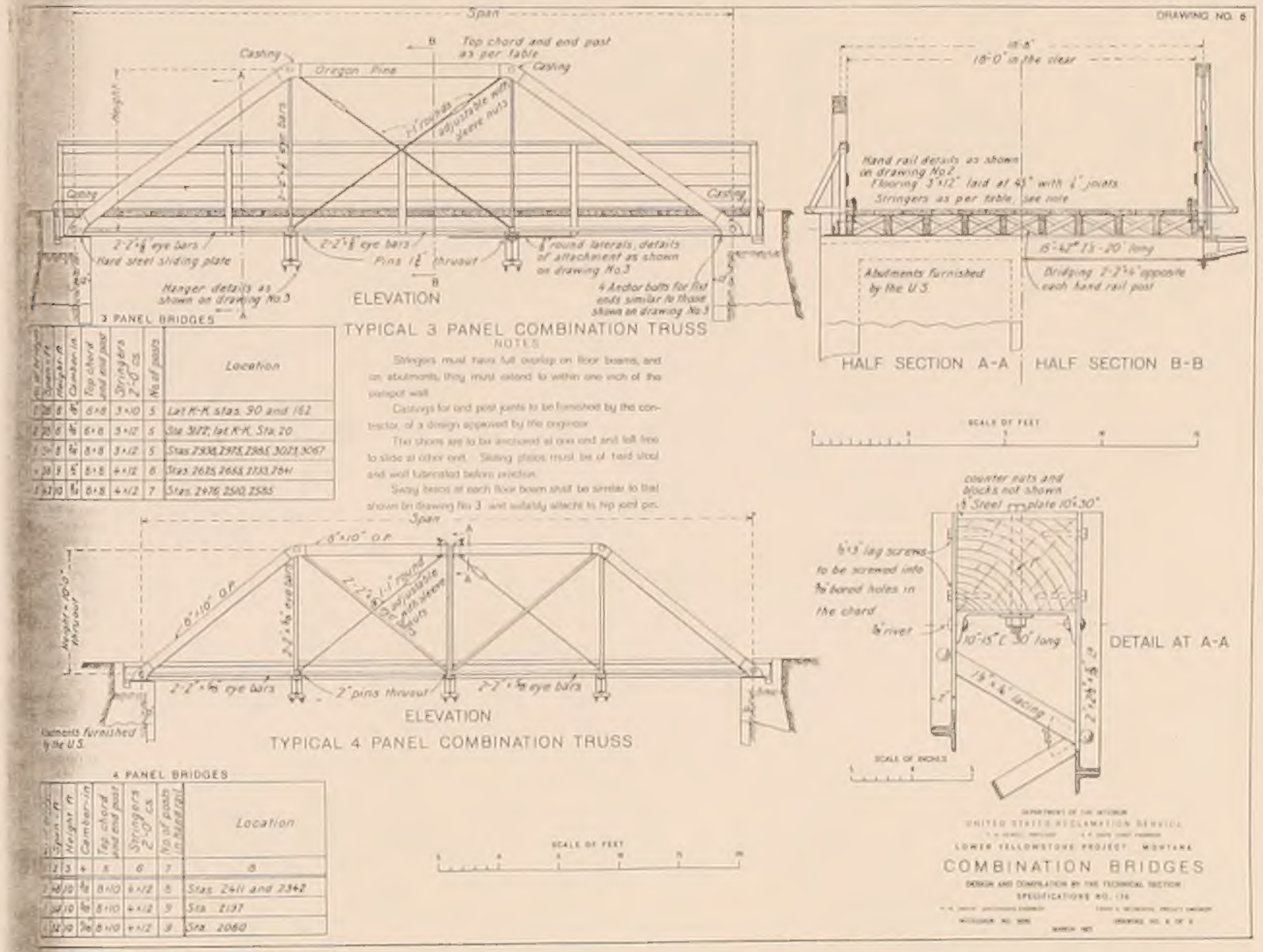
60 FOOT STEEL THRU TRUSS

DESIGN AND COMPILATION BY THE TECHNICAL SECTION
SPECIFICATIONS NO. 136
H. N. SAVAGE, SUPERVISING ENGINEER   FRANK E. WEYMOUTH, PROJECT ENGINEER
ACCESSION NO. [illegible]   DRAWING NO. 5 OF 6
MARCH 1907

DRAWING NO. 6


Span
Top chord and end post as per table
Casting
Oregon Pine
Height
1¼" rounds adjustable with sleeve nuts
2-2"×¼" eye bars
Hard steel sliding plate
Pins 1½" thruout
¾" round laterals, details of attachment as shown on drawing No. 3
Hanger details as shown on drawing No. 3
4 Anchor bolts for fixt ends similar to those shown on drawing No. 3
ELEVATION
TYPICAL 3 PANEL COMBINATION TRUSS
16'8"
16'0" in the clear
Hand rail details as shown on drawing No. 2
Flooring 3"×12" laid at 45° with ¼" joints
Stringers as per table, see note
Abutments furnished by the U.S.
15'-4½" I's-20' long
Bridging 2-2"×4" opposite each hand rail post
HALF SECTION A-A
HALF SECTION B-B
SCALE OF FEET
8"×10" O.P.
Height 10'0" thruout
2-1¼" round adjustable with sleeve nuts
2-2"×⅝" eye bars
2" pins thruout
Abutments furnished by the U.S.
ELEVATION
TYPICAL 4 PANEL COMBINATION TRUSS
counter nuts and blocks not shown
Steel plate 10"×30"
⅝"×5" lag screws to be screwed into ⅜" bored holes in the chord
⅝" rivet
10"-15# [30" long
1½"×¼" lacing
2-2½"×2½"×¼" [s
DETAIL AT A-A
SCALE OF INCHES
SCALE OF FEET

3 PANEL BRIDGES

No. of bridges	Span ft	Height ft	Camber in	Top chord and end post	Stringers 2'-0" cs.	No. of posts	Location
1	28	8	⅝	6×8	3×10	5	Lat K-K stas. 90 and 162
2	30	8	¾	6×8	3×12	5	Sta 3177; lat K-K Sta 20
5	34	8	⅞	8×8	3×12	5	Stas 2938, 2975, 2985, 3021, 3067
4	38	9	1	8×8	4×12	6	Stas 2625, 2655, 2733, 2641
3	42	10	1⅛	8×8	4×12	7	Stas. 2476, 2510, 2585

NOTES

Stringers must have full overlap on floor beams, and on abutments they must extend to within one inch of the parapet wall.

Castings for end post joints to be furnished by the contractor, of a design approved by the engineer.

The shoes are to be anchored at one end and left free to slide at other end. Sliding plates must be of hard steel and well lubricated before erection.

Sway braces at each floor beam shall be similar to that shown on drawing No. 3 and suitably attacht to top joint pin.

4 PANEL BRIDGES

No. of bridges	Span ft	Height ft	Camber in	Top chord and end post	Stringers 2'-0" cs.	No. of posts in hand rail	Location
1	2	3	4	5	6	7	8
2	46	10	1⅜	8×10	4×12	8	Stas. 2411 and 2342
1	50	10	[illegible]	8×10	4×12	9	Sta. 2197
1	52	10	[illegible]	8×10	4×12	9	Sta. 2060

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LOWER YELLOWSTONE PROJECT   MONTANA

COMBINATION BRIDGES

DESIGN AND COMPILATION BY THE TECHNICAL SECTION
SPECIFICATIONS NO. 136
H. N. SAVAGE, SUPERVISING ENGINEER   FRANK E. WEYMOUTH, PROJECT ENGINEER
ACCESSION NO. [illegible]   DRAWING NO. 6 OF 6
MARCH 1907